# THE HISTORY OF INOCULATION AND VACCINATION

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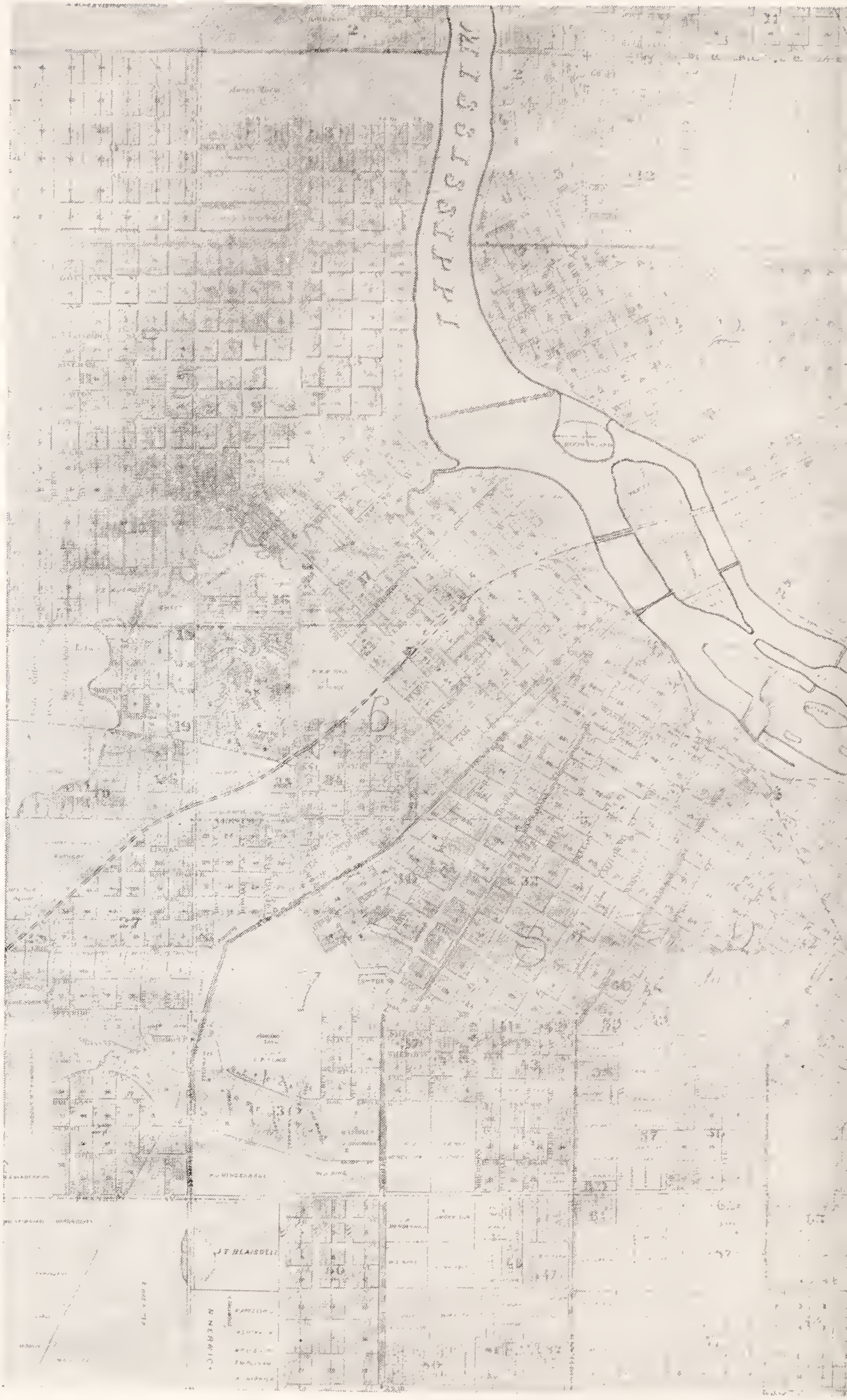

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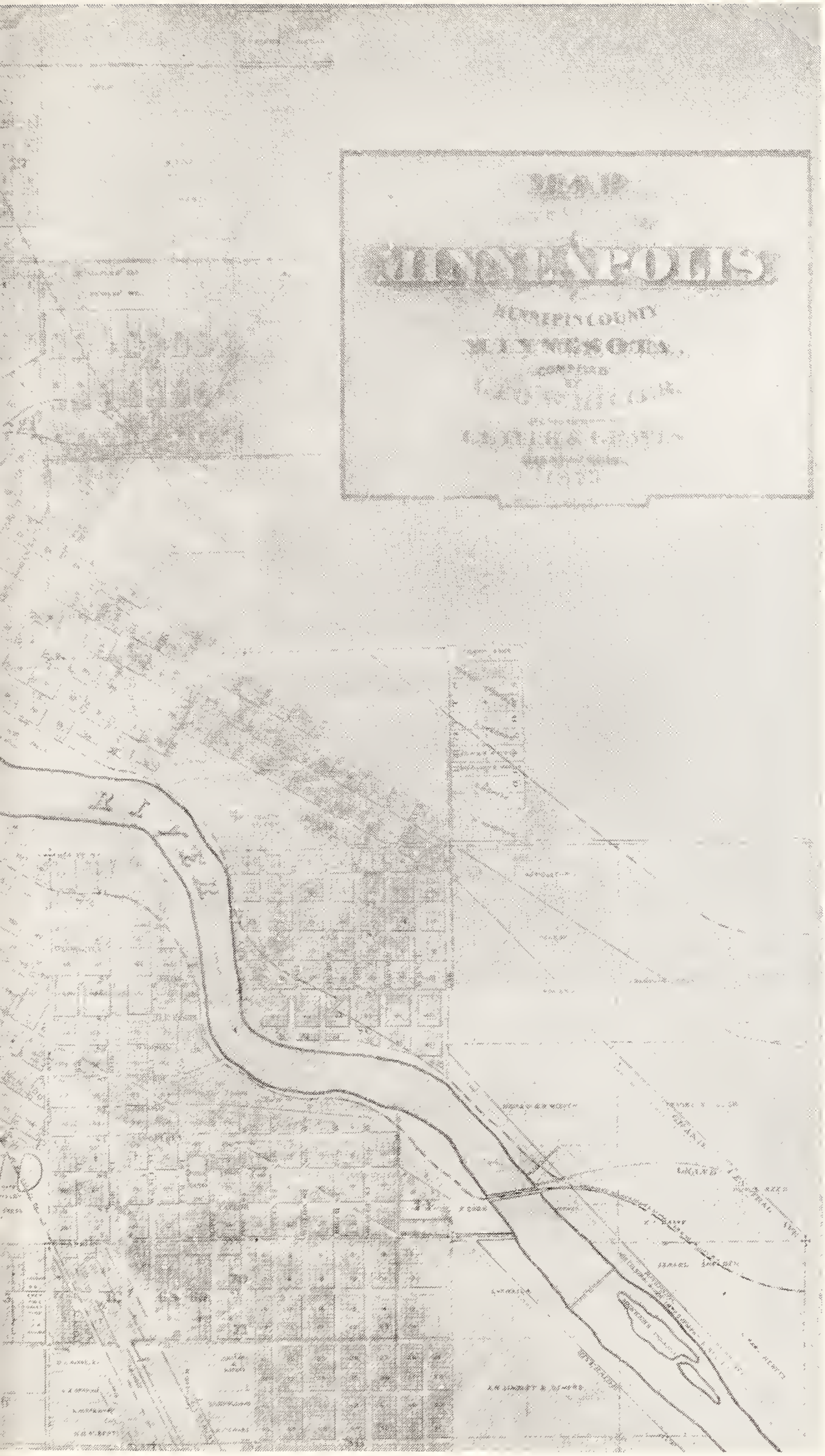

MINNESOTA, 1873

"VACCINATION"

DR. JENNER PERFORMING HIS FIRST VACCINATION

From a bronze by GIULIO MONTEVERDE

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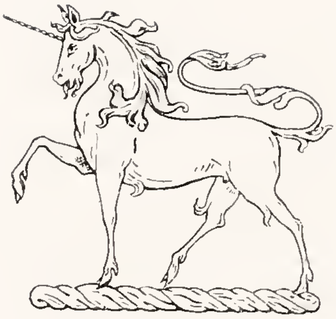

# THE HISTORY OF INOCULATION
# AND
# VACCINATION
# FOR THE
# PREVENTION AND TREATMENT OF DISEASE

LECTURE MEMORANDA

American Medical Association

MINNEAPOLIS

1913

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# FOREWORD

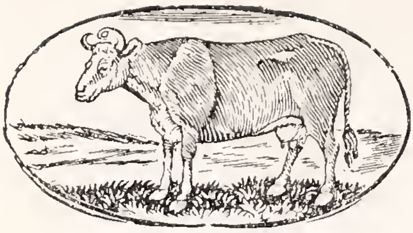
## The Historical Medical Museum
## London (Eng.), 1913

THE Historical Medical Museum, in connection with the history of medicine, chemistry, pharmacy and the allied sciences, which I have been organising for some years past, will be opened on June 24, 1913, at 54a, Wigmore Street, London, W.

With the valuable assistance of many who are also interested in this subject, and by their kind co-operation, a most interesting collection of objects illustrative of the history of the healing art, has, I am pleased to state, been brought together. The ground covered is comprehensive. and most branches of medicine, surgery and the allied sciences will be represented from the early days of the world's civilisation down to more recent times.

The Museum, which is strictly professional and scientific in character, will be open from 10 a.m. daily. The general public will not be admitted. Tickets of invitation will be forwarded on receipt of a professional card addressed to the Secretary, Historical Medical Museum, 54a, Wigmore Street, London, W.

Henry S. Wellcome



# THE HISTORY OF INOCULATION AND VACCINATION
FOR THE
PREVENTION AND TREATMENT OF DISEASE

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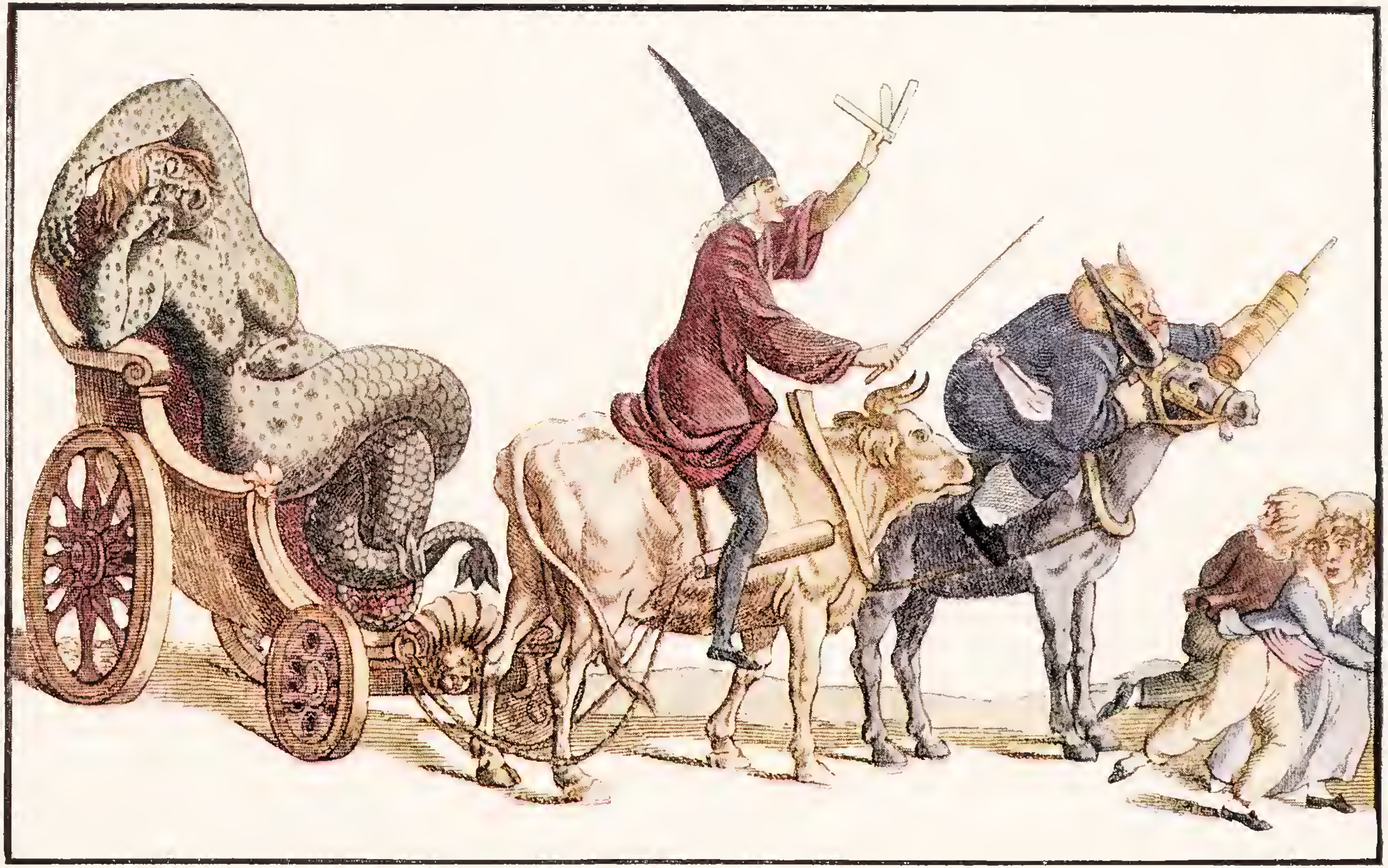
# NOTE

The illustrations used as Head-pieces, Tail-pieces, etc., in this book are reproduced direct from the woodcuts of the celebrated English engraver, THOMAS BEWICK, who was a contemporary of Jesty and Jenner.



BEWARE! THE VACCINE

From a French caricature of the XVIII century

# THE HISTORY OF INOCULATION AND VACCINATION
# FOR THE
# PREVENTION AND TREATMENT OF DISEASE

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## CHAPTER I

## THE PRACTICE OF INOCULATION IN ANTIENT TIMES

The antiquity of inoculation

THE practice of inoculation for the prevention of disease is one of considerable antiquity. The period of its discovery can only be conjectured, but there is little doubt that even in remote times it must have been recognised by man, that certain diseases occur once only during the life of an individual, or that after recovery he is generally immune against further attacks of the same disease. He also probably noticed that even a mild form of a complaint often conferred a certain protection against a further attack.

The earliest attempts to utilise this protective act of Nature probably consisted in exposing children to the infection of some disease such as measles, in a mild form, in order to protect them against severer forms of the complaint in future. This custom was practised down to comparatively recent times.

First steps

Thus it is probable that a vague appreciation of the principles of immunity existed at a very early period. From this knowledge it was but a short step to the artificial production of certain diseases; especially when it was found, as in the case of smallpox, that a mild form of the complaint could be induced by the inoculation of the contents of a pustule into a healthy subject, and that such an inoculation was to some extent a safeguard against the possibility of contracting a severe attack of the disease.

of inoculation has been known and practised among the Moorish and Arab tribes in Northern Africa from antient times, to protect them from smallpox. They inoculate their patients both on the arms and legs in seven distinct places, thus using a mystic number.

Among some of the savage tribes that inhabit the regions of the Upper Congo, travellers state that a method of inoculation to prevent syphilis is practised by the natives.

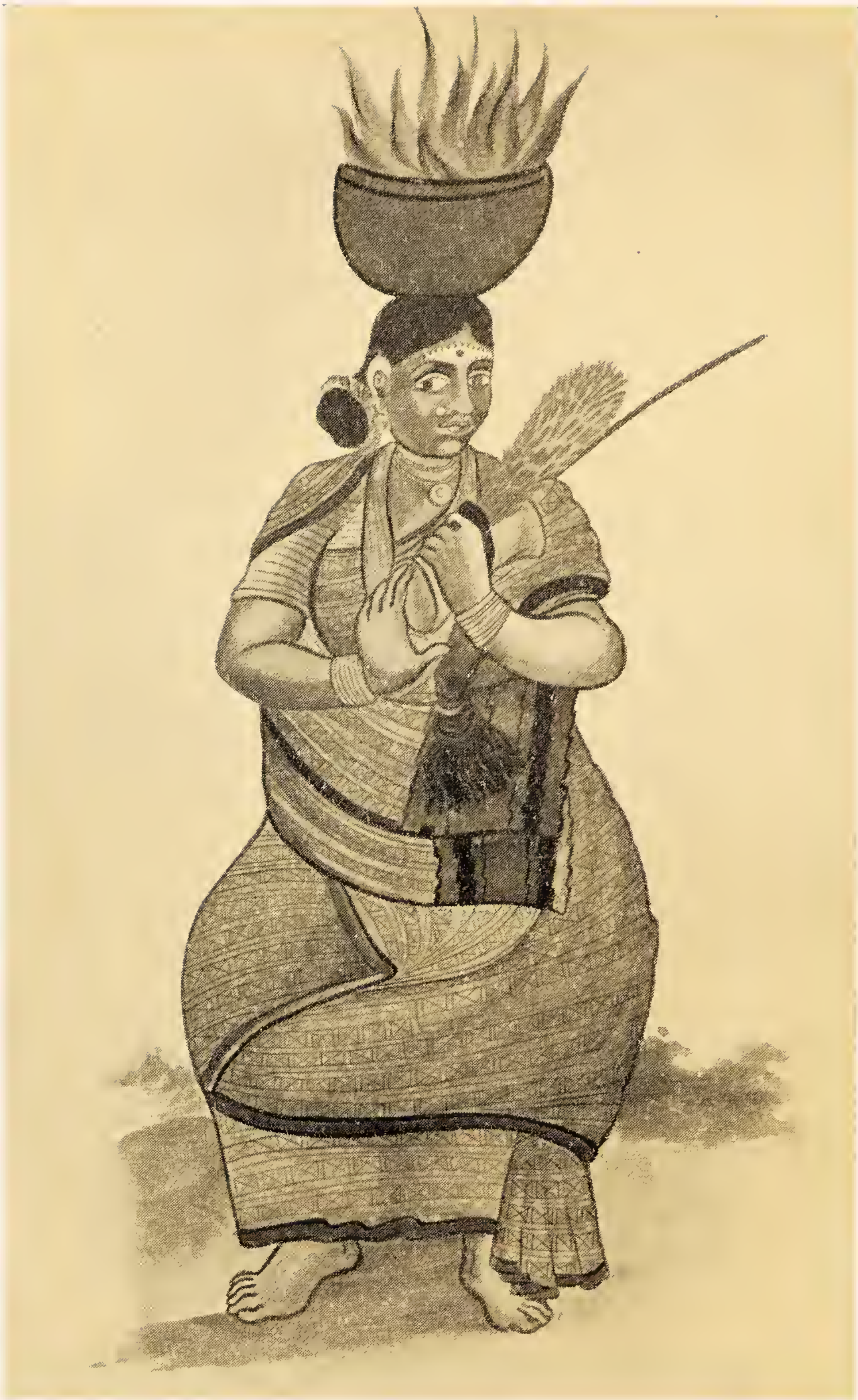
Felkin, in his "Travels among the Baris of Lado," 1882, says that "smallpox is often very prevalent in these districts, and also venereal diseases. At one time they were so bad that inoculation was practised, and this has since become the general law. It is performed over the left breast, and the natives say they believe the disease will be stamped out in time, so much good has resulted from the practice. It is a noteworthy fact that they have discovered this method, for after many enquiries I am quite certain it has not been introduced from foreign sources."

Inoculation for smallpox and venereal diseases

In other parts of Africa, also, explorers have recorded that they found inoculation known to, and practised by, the natives. Among the negroes in Senegal the practice of inoculating children on the arm against smallpox was a common one. After the operation they were made to abstain from animal food, and were allowed to drink freely of water acidulated with lime juice.

De Rochebrune relates that the Moors and Pouls of Senegambia have for ages inoculated their cattle against pleuro-pneumonia. "The point of a knife or dagger of primitive form is plunged into the lung of an animal that has died of the disease, and an incision, sufficient to allow the virus to penetrate below the skin of the healthy animal, is made into the supra-nasal region."

Pleuro-pneumonia in cattle



A MALABA WOMAN INVOKING THE GODDESS OF SMALLPOX AND CARRYING FIRE ON HER HEAD SYMBOLIC OF THE DISEASE

From a native drawing

It is stated that at Berne, in Switzerland, in the eighteenth century a similar form of inoculation against pleuro-pneumonia was practised.

Boer methods

According to Sternberg, the natives on the banks of the *Zambesi* cause animals afflicted with pleuro-pneumonia to swallow a certain quantity of the liquid from the pleural cavity of an animal recently dead. The method, however, which is employed most extensively, is that said to have been discovered by the Boers. This consists in inoculating animals in the tail, by means of a syringe or worsted thread, with serum from the lungs of an animal recently dead, or with virus obtained from the tumefaction produced by such an inoculation in the tail.

From evidence that has been gathered from various parts of the world, the practice of inoculation appears to have originated with smallpox, a disease of which the early history is somewhat obscure. It may be interesting, therefore, to recapitulate briefly what is known of its origin.

The origin of smallpox and inoculation

The antiquity of the disease in the Far East appears to be without doubt, but the documentary records concerning its first appearance are shadowy and uncertain. According to tradition, smallpox appears to have had its origin in India, where inoculation is said to have been practised over a thousand years before the Christian era.

Dhanwantari, the Vedic father of medicine, and the earliest known Hindu physician, who is supposed to have lived about 1500 B.C., is said to have been the first to have practised inoculation for smallpox. It is even stated that the antient Hindus employed a vaccine, which they prepared by transmission of the smallpox virus through the cow. King quotes the following, which is stated to be translated from the writings of Dhanwantari :—

"Take the fluid of the pock on the udder of the cow or on the arm between the shoulder and elbow of a human subject on the point of a lancet, and lance with it the arms between the shoulders and elbows until the blood appears. Then, mixing this fluid with the blood, the fever of the smallpox will be produced."

Lord Ampthill, Governor of Madras, at the opening of the King Institute in February, 1905, said: "Colonel King gives clear proof that the antient caste injunctions of the Hindus were based on a belief in the existence of transmissible agents of disease, and that both Hindus and Mohammedans used inoculation by smallpox virus as a protection against smallpox; and certain it is that long before Jenner's great discovery, or, to be more correct, re-discovery of vaccination, this art of inoculation was used for a while in Europe, where it had been imported from Constantinople, and the knowledge of medicine which flourished in the Near East at the commencement of the Christian era, emanated, as I have already shown you, from India. It is also very probable, so Colonel King assures me, that the antient Hindus used animal vaccination, secured by transmission of the smallpox virus through the cow, and he bases this interesting theory on a quotation from a writing by Dhanwantari, the greatest of the antient Hindu physicians."

Brahmin inoculators

Holwell, writing in 1757, gives some interesting details as to the method of inoculation employed by the Hindus. He states: "It is performed in Indostan by a particular tribe of Brahmins, who are delegated annually for this service from the different colleges scattered throughout the distant provinces. Dividing themselves into small parties of three or four, they plan their travelling circuit in such a way as to arrive at the places of their expected destination some weeks before the usual return of the disease; they arrive commonly in the Bengal provinces early in February, although in some years they do not begin inoculation before

March, deferring it until they have considered the state of the season, and acquired information of the state of the distemper.

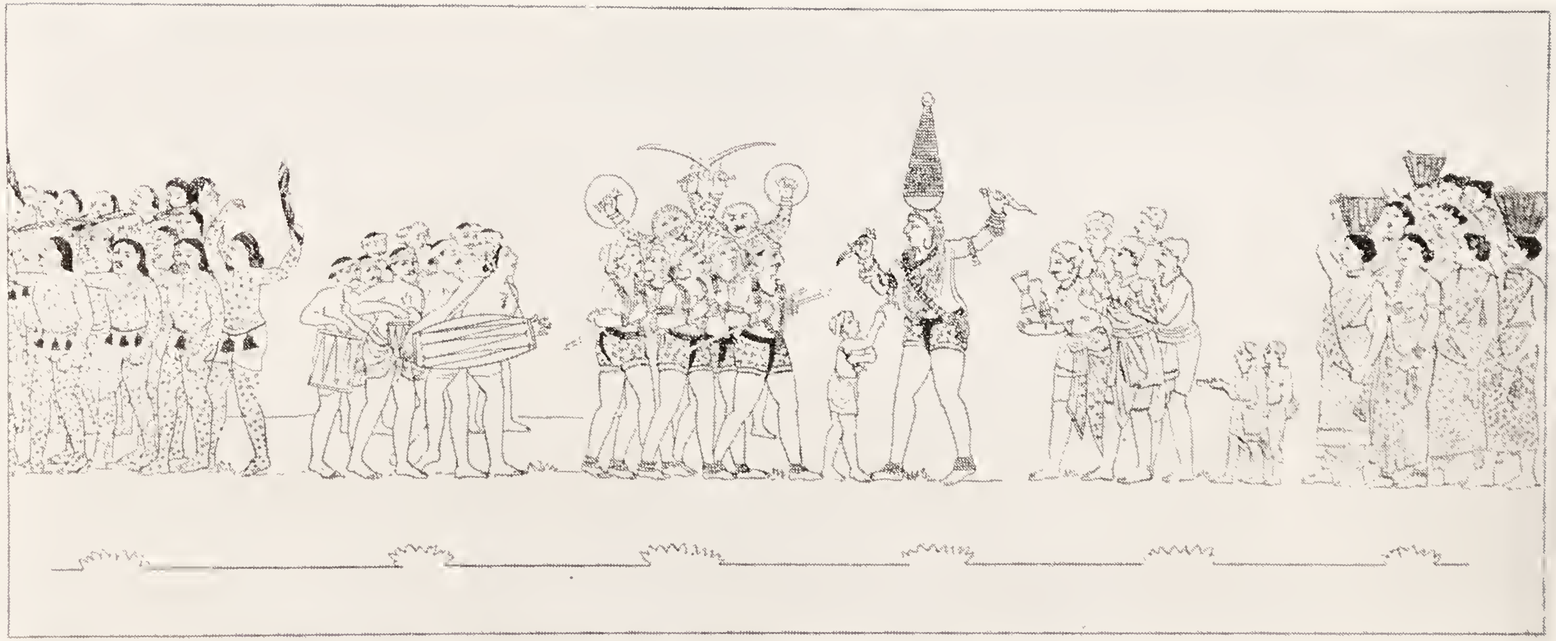
"The inhabitants of Bengal, knowing the usual time when the inoculating Brahmins annually return, observe strictly the regimen enjoined, whether they determine to be inoculated or not; this preparation consists only in abstaining for a month from fish, milk, and ghee (a kind of butter made generally of buffalo's milk); the prohibition of fish refers only to the native Portuguese and Mohammedans who abound in every province of the empire. When the Brahmins begin to inoculate, they pass from house to house and operate at the door, refusing to inoculate any who have not, on a strict scrutiny, duly observed the preparatory course enjoined them.

Dietetic regimen preparatory to inoculation

"It is no uncommon thing for them to ask the parents how many pocks they chuse their children should have. Vanity, we should think, urged a question on a matter seemingly so uncertain in the issue; but true it is that they hardly ever exceed or are deficient in the number required.

"They inoculate indifferently on any part; but, if left to their choice, they prefer the outside of the arm, midway between the wrist and the elbow for the males; and the same between the elbow and the shoulder for the females. Previous to the operation, the operator takes a piece of cloth in his hand (which becomes his perquisite if the family is opulent), and with it gives a dry friction upon the part intended for inoculation for the space of eight or ten minutes, about the compass of a silver groat, just making the smallest appearance of blood; then opening a linen double rag (which he always keeps in a cloth round his waist), he takes from thence a small pledget of cotton charged with the variolous matter, which he moistens with two or three drops of the Ganges

Method of inoculation



A Religious Dramatic Representation of the Power of the Hindoo Goddess of Smallpox

From an Antient Oriental Drawing

The goddess stands with two uplifted crooked daggers, threatening to strike on the right and left. Before her is a band of the executors of her vengeance. Two of them wear grinning red masks, carry black shields, and brandish naked scimitars. White lines, like rays, issue from the bodies of the others, to indicate infection. On the left there is a group of men with spotted bodies, inflicted with the malady; bells are hung at their cinctures, and a few of them wave in their hands black feathers. They are preceded by musicians with drums, who are supplicating the pity of the furious deity. Behind the goddess, on the right, there advances a bevy of smiling young women, who are carrying gracefully on their heads baskets with thanksgiving offerings, in gratitude for their lives and their beauty having been spared. There is, besides, a little boy with a bell at his girdle, who seems to be conveying something from the right arm of the goddess. This action may probably be emblematic of inoculation. In a country where every thought, word and deed are mere repetitions of those of their progenitors, a composition like this bears the stamp of great antiquity. (Moore.)

water, and applies it to the wound, fixing it on with a slight bandage, and ordering it to remain on for six hours without being moved; then the bandage to be taken off, and the pledget to remain until it falls off itself." (During the time this operation lasts, he does not cease to repeat certain passages from a sacred book, stated by the Brahmins to be three thousand, three hundred and sixty-seven years old.)

"The cotton, which he preserves in a double calico rag, is saturated with matter from the inoculated pustules of the preceding year; for they never inoculate with fresh matter, nor with matter from the disease caught in the natural way, however distinct and mild the species . . . . Early on the morning succeeding the operation, four collons (an earthen pot containing about two gallons) of cold water are ordered to be thrown over the patient, from the head downwards, and to be repeated every morning and evening until the fever comes on (which usually is about the close of the sixth day from the inoculation), then to desist until the appearance of the eruptions (which commonly happens at the close of the third complete day from the commencement of the fever), and then to pursue the cold bathing as before through the course of the disease, and until the scabs of the pustules drop off. They are ordered to open all the pustules with a fine sharp-pointed thorn as soon as they begin to change their colour, and whilst the matter continues in a fluid state. Confinement to the house is absolutely forbidden, and the inoculated are ordered to be exposed to every air that blows, and the utmost indulgence they are allowed when the fever comes on, is to be laid upon a mat at the door; but, in fact, the eruptive fever is generally so inconsiderable and trifling as very seldom to require this indulgence. Their regimen is ordered to consist of plantains, sugar-canes, water-melons, rice, gruel made of white poppy-seeds and cold water, or thin rice gruel for their ordinary drink. These instructions being given, and an injunction laid on the patients to make a thanksgiving, Poojah, or offering to the goddess on their recovery, the operator takes his fee, which from the poor is a *pund of cowries*, equal to about a penny sterling, and goes on to another door down one side of the street, and up on the other; and is thus employed from morning to night, inoculating sometimes eight or ten in a house."

Inoculation in China

Although it is said by some that the practice was introduced from India about 200 B.C., China has often been referred to as being the birthplace of inoculation. This, however, is now disputed, and doubt is cast upon it, owing to difficulty in identifying the ideograph or Chinese written character signifying the name of the disease. Recent investigators are of the opinion that the word "smallpox" in China does not date earlier than the fourteenth century. There is a reference, however, in an antient Chinese work to an ambassador to the Court in A.D. 561, of whom it is said "he had just passed through the feverish disease, and his face was covered with scars," but this may or may not have been smallpox. In the year 1631, it was stated by Wylie that "smallpox has engaged the attention of the Chinese from near the commencement of the Christian era, and inoculation has been practised among them for a thousand years or more." He bases this statement, apparently, on a Chinese treatise on pock spots, said to have been published in 1323 and republished in 1542, but we have not been able to trace this work for verification.

In 1626

The most reliable evidence of the antiquity of the practice of inoculation in China is that given by François Xavier d'Entrecolles, who was a Jesuit missionary in China in the seventeenth century. He states definitely, in a letter written from Peking in May, 1726, that the practice was known in China for a century before that date, and quotes an extract from the works of a Chinese physician who lived in the Ming dynasty, *ca.* 1626, who mentions the practice, but says that as everyone

must necessarily have smallpox once in their lives, it was better to let it be contracted naturally.

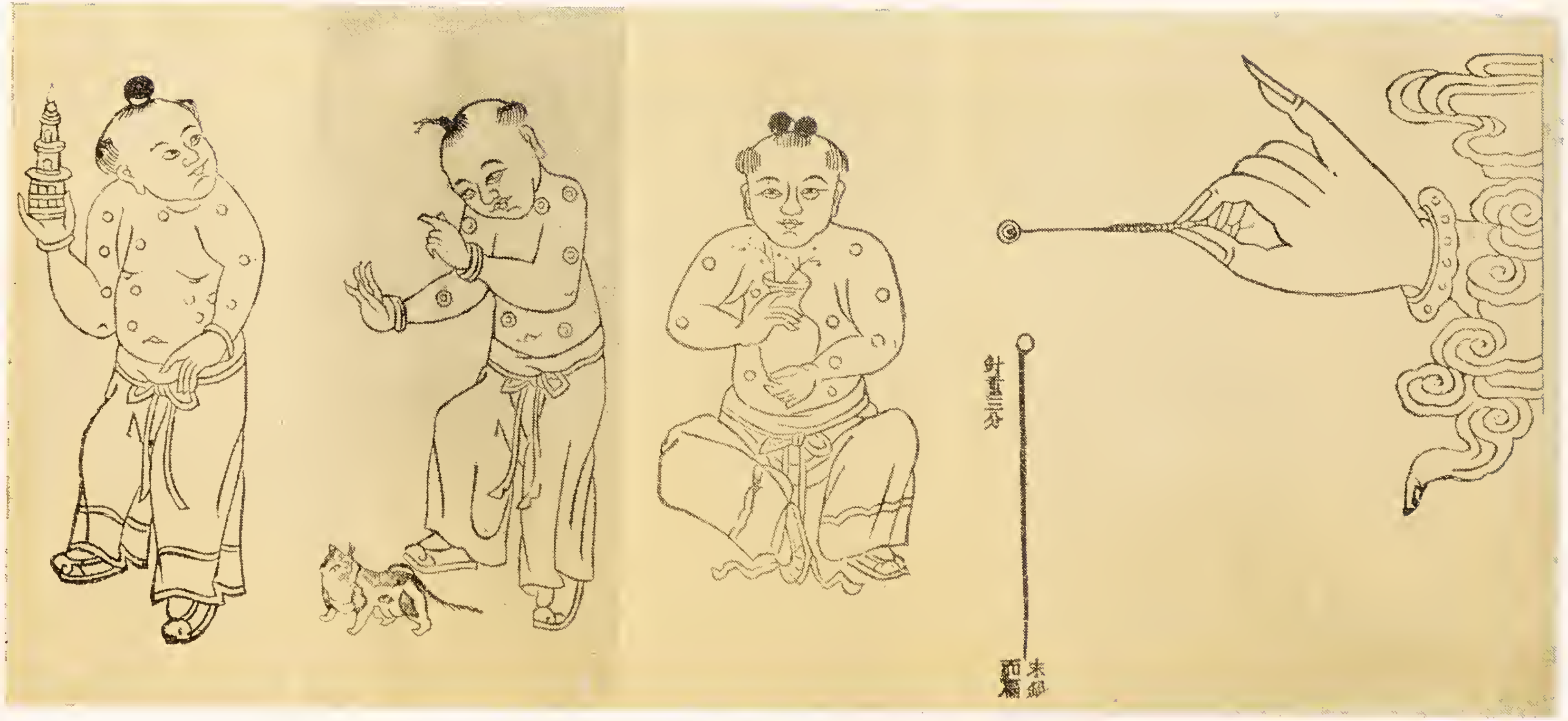
D'Entrecolles states, concerning the Chinese phrase for smallpox inoculation, "*tchung-teou*," meaning "*tchung*" to sow, "*teou*" smallpox, that the latter word also means "eating peas," and that the Chinese probably gave this name to smallpox on account of the similarity of the pustules to peas.

The Chinese method in 1726

According to a recipe given to the missionary by a Court physician in 1726, the Chinese placed the dried matter of the smallpox pustule in a vase, which they very carefully sealed. They stated that "if kept in this way, the matter would retain its virulence for several years, but that if the vase had the smallest opening it lost its virulence in twenty days. The method of inoculation was to take four scales, if small, or two, if large, and place musk between them, a little more than a grain in weight; place all in a piece of cotton, and insert in the nostril. In the case of a boy, place in the right nostril, and of a girl, in the left. The smallpox virus must be taken from young children, between the ages of one and seven."

If it were necessary to resort to the use of recent pustules, they were exposed to the steam of an infusion of the herb scorzonera and liquorice, in order to correct "the acrimony of the matter." Sometimes they used scales, previously dried and powdered, then made into a paste, the whole being wrapped up in cotton wool, and introduced into the patient's nostrils. This often set up a troublesome inflammation, and even if this did not take place, the inhalation into the lungs often produced the disease itself.

D'Entrecolles further states that the Emperor of China sent physicians from Peking, in 1724, to Tartary, the inhabitants of which country were suffering from an epidemic of smallpox, in order to inoculate the children against the disease. We are assured that the operations they performed were successful, a fact which seems to be corroborated by the statement



FIGURES SHOWING VACCINATION PUSTULES

From a Chinese work on Vaccination

that the physicians returned to Peking laden with presents of horses, skins, etc., presented to them by the Tartars in payment for their services.

Another account

Kirkpatrick, who also describes the Chinese method of inoculation, gives a slightly different account. He states that, instead of using the dried scales, a small piece of cotton was dipped into the fresh and fluid matter of the pustules, and immediately introduced into the nose. Apparently, therefore, the Chinese employed both the dried and fluid variolous matter, but the method of introduction through the nose appears to be peculiar to the Chinese.

In Tibet, inoculation is said to have been practised from antient times, the method employed being to dip a bundle of needles in a solution of the pock virus and the dried crusts in water, and then to prick the arm with the same.

In Siam a method of inoculation similar to that employed in China, whence it was probably introduced, is practised. The pus is taken from the pustules, and blown into the nostrils, and this is claimed to protect the individual thus inoculated against an attack of the disease.

First outbreak of smallpox in Europe

The actual period of the first outbreak of smallpox in Europe was probably about the latter part of the sixth century. It appears to have travelled west through Arabia, Ethiopia and the neighbouring countries, and was brought by the Arabs into Egypt. It was apparently unknown to the Greeks and Romans, and, according to antient historians, does not appear to have attacked civilised nations engaged in commerce or wars in foreign countries, before the latter end of the sixth, or the beginning of the seventh, century.

The earliest definite statements concerning the disease come to us from Arabia, and, according to an Arab manuscript in the library at Leyden, the first record of smallpox dates from A.D. 572, the year of Mohammed's birth. From the following passages in the Chronicle of Bishop Marius, who died in A.D. 590, it might, however, be inferred that smallpox dates from a slightly earlier period than that indicated in the Leyden manuscript:—

"In 570 a powerful scourge with flow from the abdomen and pox spread extensively over Italy and France; and oxen in the mentioned countries were . . . ."

"In 571 an abominable infirmity and glanders, which is its name, and pustules, killed innumerable people in the above-mentioned countries."

There is further evidence of its appearance among the Abyssinian army of Abraha, at the siege of Mecca, in what was known as the Elephant War of A.D. 569 or 571.

Referring to this, Tabari, one of the most reliable of the Arab historians, states: "It has been told to us by Ibn Humaid, after Salima, after Ibn Ischâg, to whom Ja'gûb b. Otha b. Mughira b. Achnas related that one had said to him, that in that year the smallpoc appeared for the first time in Arabia, and also the bitter herbs, rue, colocynth (and another)."

He then proceeds to relate the following interesting legend as to the cause of the disease:—

"Thereupon came the birds from the sea in flocks, every one with three stones, in the claws two and in the beak one, and threw the stones upon them. Wherever one of these stones struck, there arose an evil wound, and pustules all over. At that time the smallpox first appeared and the bitter trees. The stones undid them wholly. Thereafter God sent a torrent which carried them away and swept them into the sea. But Abraha and the remnant of his men fled; he himself lost one limb after another."

In a former passage the calamity of Abraha is thus described: "But Abraha was smitten with a heavy

stroke; as they brought him along in the retreat his limbs fell off piece by piece, and as often as a piece fell off, matter and blood came forth."

To illustrate this account by Tabari, his recent editor, Nöldeke, cites the following from an anti-Mohammedan poem: "Sixty thousand returned not to their homes, nor did their sick continue in life after their return." One of the elephants that dared to enter the sacred region is said to have been also wounded and afflicted by the smallpox.

"In this narrative of Abraha's disaster," says Nöldeke, "there is a mixture of natural causation and of purely fabulous miracle; a real and sufficient account of the Abyssinian leader's discomfiture, namely an outbreak of smallpox, had been blended with legendary tales. That the disease was smallpox is made probable by the continuity of the Arabic name. Rhazes, under the same name, later described the symptoms, pathology and treatment of what was unquestionably the smallpox afterwards familiar in Western Europe."

It is stated by another historian that smallpox broke out on the sacking of Alexandria by the Arabs in A.D. 640; thence it spread, by means of the pilgrims and commerce, through Egypt, Palestine, Syria and Persia, and is said to have broken out along the coast of North Africa. In the commencement of the eighth century it was known in Mauretania, and thence crossed the Mediterranean into Italy. It was also about this period that the Arabs and Moors introduced it into Spain, when they established themselves at Cordova. Afterwards it passed to Portugal, Navarre, Languedoc and Guienne, whence it was carried into Western and Northern Europe.

The earliest physician to describe smallpox was Ahrun, an Egyptian by birth, and a Christian priest, who lived at Alexandria under Heraclius (A.D. 610–641). He wrote a work on physic in thirty books, now lost, entitled "Pandectae Medicinae," in which he is said to have described the symptoms of smallpox and its eruption, and to have distinguished the milder from the dangerous variety. This work, originally written in Greek, was translated into Syriac by Gosius, about A.D. 680, and Maserjawaih, a Jewish physician of Bassora, translated it into Arabic, about A.D. 683, with the addition of some observations of his own as to the treatment of diseases of the eyes proceeding from smallpox.

The next to notice the disease was George, physician to Almangar, who was a great patron of learning. In a work written about A.D. 795 he describes smallpox and its symptoms.

The effects of smallpox are also noticed by John, a son of Mesue, a Syrian by birth, who was connected with the medical school of Baghdad, formed under the protection of Haroun Al Raschid, to whom he was physician. He advises, in his course of treatment, that "the body, if necessary, should be kept open until the seventh day."

Isaac Johannitius is the next physician to allude to smallpox. He recommends bleeding, and observes that the body should be restrained for three weeks.

The first complete treatise on the disease was written by Rhazes, about A.D. 920; originally written in Syriac, this work was translated into Greek and then into Latin.

Smallpox in Syriac was termed "chaspe," which was translated into Greek as Επφλογόῶ. The Latin translator first termed it "Incendium." The word "variolæ" is derived from the Hebrew בדפּ, meaning a spot or speck. Hence the Latin "varus" or "variola," the Italian "vajolo," the French "vérole," and the English "smallpox."

Rhazes describes the signs, characteristic symptoms and remedies for the disease, but the latter he borrows chiefly from his predecessor Ahrun.

The first allusion to smallpox in England is that made in the Anglo-Saxon manuscript, "Medicinale

Anglicum," which is said to have been written in the early part of the tenth century. In one of the leechdoms there is an allusion to the "pockes," the plural of a word which signifies "a pustule." On the appearance of the disease, bleeding is recommended, to be followed by the following treatment:—

"Against pockes: very much shall one let blood, and drink a bowlful of melted butter; if they (the pustules) strike out, one shall dig each with a thorn, and then drop one-year alder-drink in, then they will not be seen."

This last instruction, evidently intended to prevent pitting, clearly identifies the disease.

In Egypt, inoculation for smallpox is said to have been practised in the thirteenth century. Matty states that the Mamelukes introduced it at the time of the Crusades, and the conquering Arabs carried it to other parts of Africa, especially to the countries bordering the Red Sea. The slave merchants who brought the Mamelukes to Alexandria, whence they were taken to Cairo and sold to Saladin, probably played their part in spreading the knowledge of inoculation in the south of Egypt and adjacent countries. The method, however, is said not to have been largely favoured by strict Mohammedans.

A further allusion in early English medical literature to smallpox is made by John of Gaddesdon in the "Rosa Anglica," which was written between 1305 and 1314. He devotes a chapter to "De variolis (et morbilis)," but this does not appear to possess much originality, and is distinctly borrowed from the early Arab writers.

Sydenham was the first great English physician to make a study of the disease, and he advised the use of bleeding, and directed that the patient should be taken out of bed and exposed to the cool air of his room during the time the fever is at its highest.

DR. THOMAS DIMSDALE

(AFTERWARDS BARON DIMSDALE)

Born 1712 Died 1800

## CHAPTER II

### SMALLPOX INOCULATION IN EUROPE FROM THE SEVENTEENTH TO THE EIGHTEENTH CENTURY

From Asia and Africa the practice of smallpox inoculation passed into Europe by way of Greece and the coasts of the Bosphorus to Constantinople, where it was known at the latter part of the seventeenth century.

In 1701, when a serious epidemic of the disease broke out in that city, Timoni and Pylarini, two medical men who were there at the time, and who were aware of the practice, recommended the employment of inoculation.

Timoni first saw inoculation practised in Constantinople by two women, and describes the operation in detail.

"The Circassians, Georgians and other Asiaticks," he states, "have introduced this practice of procuring the smallpox by a sort of inoculation for about the space of forty years, among the Turks and others at Constantinople. They that have this inoculation practised upon them are subject to very slight symptoms, some being scarce sensible that they are ill or sick. The method of the operation is thus: Choice being made of a proper contagion, the matter of the pustules is to be communicated to the person proposed to take the infection, whence it has metaphorically the name of insition or inoculation.

Inoculation by women in Constantinople

"For this purpose they make choice of some boy or young lad, of a sound healthy temperament, that is seized with the common smallpox (of the distinct, not flux sort), on the twelfth or thirteenth day from the beginning of his sickness; they, with a needle, prick the tubercles (chiefly those on the shins and hands), and press out the matter coming from them into some convenient vessel or glass, or the like, to receive it. It is convenient to wash and clean the vessel first with warm water. A convenient quantity of this matter being thus collected is to be stopped close and kept warm in the bosom of the person that carries it, and as soon as may be brought to the place of the future expecting patient. The patient, therefore, being in a warm chamber, the operator is to make several little wounds with a needle in one, two or more places of the skin until some drops of blood follow, and immediately drop out some drops of the matter in the glass and mix it well with the blood issuing out; one drop of the matter is sufficient for each place prick'd. These punctures are made indifferently in any of the fleshy parts, but succeed best in the muscles of the arm or radius. The needle is to be a three-edg'd surgeon's needle; it may likewise be performed with a lancet. The custom is to run the needle transverse and rip up the skin a little, that there may be a convenient dividing of the part, and the mixing of the matter with the blood more easily perform'd; which is done either with a blunt stile or an ear-picker. The wound is covered with a half a walnut shell or the like concave vessel and bound over, that the matter may not be rubb'd off by the garments, which is all removed in a few hours. The patient is to take care of his diet. In this place the custom is to abstain wholly from flesh and broth for twenty or twenty-five days. This operation is performed either in the beginning of the winter or in the spring."

Their method described

Another method was described by Pylarini shortly afterwards, which he saw practised in Turkey by an old woman on the four sons of a Greek nobleman. It consisted in inserting the variolous matter into a number of punctures made on the forehead, cheeks, chin and wrist.

As stated by Timoni, the practice of inoculation for smallpox was introduced into Turkey from Circassia, where it was said to have been employed for a considerable period previously.

In Denmark

The Danes appear to have practised inoculation against smallpox from the seventeenth century, and, according to Bartholin, writing in Copenhagen, in 1673, "the practice was a common one in Denmark." In 1758, two inoculation houses were established by the King in the capital, and, in 1760, one of the royal princes was inoculated, with success.

In 1711, De La Motraye says that he saw the operation performed on a Circassian girl, four or five years old. The girl after being purged with dried fruits, was carried to a boy about three years old, who had caught the natural smallpox, and whose pocks were *ripe*. An old woman performed the operation; for women of advanced age exercised the practice of physic in Circassia. The manner of inoculating the disease he describes as follows:—

The Circassian method

"She took three needles fastened together, and prick'd first the pit of the stomach; secondly, directly over the heart; thirdly, the navel; fourthly, the right wrist; and, fifthly, the ankle of the left foot, till the blood came. At the same time, she took some matter from the pocks of the sick person, and applied it to the bleeding part, which she covered, first with *angelica* leaves dri'd, and after with some of the youngest lamb-skins; and having bound them all well on, the mother wrapped her daughter up in one of the skin coverings, which, I have observed, compose the Circassian beds, and carried her thus packed up in her arms to her own home; where (as they told me) she was to continue to be kept warm, eat only a sort of pap made of cummin flower, with two-thirds water and one-third sheep's milk, without either flesh or fish, and drink a sort of tisan, made with *angelica*, *bugloss* roots and *licorish*, which are all very common throughout this country, and they assured me that with this precaution and *regimen*, the smallpox generally came out very favourably in five or six days."

Kennedy, an English surgeon, in an essay on external remedies, written in 1715, describes the method of ingrafting the smallpox, as practised in the Peloponnesus, now called the Morea, which he states "at this present time is very much used both in Turkey and in Persia, where they give it in order to prevent its more dismal effects by the early knowledge of its coming, as also probably to prevent their being troubled with it a second time.

Persian and Turkish methods compared

"The Persians use the pock and matter dried into powder, which they take inwardly, but in Turkey, more particularly in Constantinople, they first take a fresh and kindly pock from someone ill of this distemper, and having made scarifications upon the forehead, wrists and legs, or extremities, the matter of the pock is laid upon the foresaid incision, being bound on there for eight or ten days together; at the end of which time, the usual symptoms begin to appear, and the distemper comes forward as if naturally taken ill, though in a more kindly manner and not near the number of pox. During this time, or from the scarifications being made, the patient is closely confined to his room, so as in no way to be exposed to the air; and the regimen or diet during the whole time of confinement is altogether from flesh, and one kept mostly to water-gruel. By this very regular way of living the distemper, or pock, comes out more kindly and less dangerous, since it is very probable that most of the malignity is increased and augmented by the irregularities committed in their diet or their manner of living some few days before the malady appears—which, when it comes naturally, cannot be so well seen or known how to prevent its worst symptoms, so as when given after this manner."

In 1726, Dr. Russell, a physician then residing in Aleppo, records the fact that he met with an old Bedouin servant, who was familiar with the practice of inoculation. This, she asserted, was done with a

needle, and she herself had received the disease in that manner when a child. She informed Dr. Russell the practice was well known to the Arabs, and that they termed it "buying the smallpox." On prosecuting further enquiries into the subject, Russell found that the practice of inoculation had been one of long standing among the Arabs, and even those over seventy years of age remembered to have heard of the custom among their ancestors.

Known to the Arabs

Their method of operating was to make several punctures in some fleshy part with a needle which had been charged with variolous matter taken from a favourable kind of pock. They used no preparatory treatment, and the disease communicated in this way, they affirmed, was always slight. The origin of the term "buying the smallpox," is somewhat curious, and it is said to have taken rise from the following ceremony:—

"The child to be inoculated carries a few raisins, dates, sugar plums, or such like; and showing them to the child from whom the matter is to be taken, asks how many pocks he will give in exchange. The bargain being made, they proceed to the operation. When the parties are too young to speak for themselves, the bargain is made by the mothers. This ceremony, which is still practised, points out a reason for the name given to inoculation by the Arabs; but by what I could learn among the women, it is not regarded as indispensably necessary to the success of the operation, and is, in fact, often omitted."

The Arabian method

The same custom was found to prevail among the Eastern Arabs, not only at Baghdad and Mousul, but in Bassora. At Mousul the appearance of smallpox was announced by the public crier, so that those who wished might have their children inoculated.

Various races appear to have inoculated in different parts of the body. Thus the Arabs usually chose the hand, between the thumb and first finger, the Georgians the forearm, and the Armenians both thighs.

In Armenia

In Armenia the Turkoman tribe, as well as the Armenian Christians, are said to have practised inoculation for a period beyond the memory of man, but they are unable to give any account of its first introduction among them. Along the coast of Syria and Palestine, and also at Damascus, inoculation has long been practised, and in the Castravan mountains it is known to, and employed by, the Drusi as well as the Christians.

Tripoli, Tunis, Algiers

In Tripoli, Tunis and Algiers, the practice of inoculation was described by Cassim Aga, ambassador in England in 1728. He states that the method employed by those who wished to have their children inoculated was to carry them to one that was afflicted with the smallpox at the time when the pustules had come to full maturity. "Then the surgeon makes an incision on the back of the hand, between the thumb and forefinger, and puts a little of the matter, squeezed out of one of the largest and fullest pustules, into the wound. This done, the child's hand is wrapped up in a handkerchief to keep it from the air, and he is left to his liberty till the fever arising confines him to his bed, which commonly happens at the end of three or four days. After that, by God's permission, a few pustules of the smallpox break out upon the child. All this I can confirm by the domestic proof, for my father carried four brothers and three sisters to the house of a girl that lay ill of the smallpox, and had us all inoculated the same day." He concludes by stating that "this practice is withall so antient in the kingdoms of Tripoli, Tunis and Algiers, that nobody remembers its first rise, and it is practised generally, not only by the inhabitants of the towns, but also by the wild Arabs."

In Western Europe, according to Schwenk, inoculation was practised in Meurs, in France, and also in

Cleves, as early as 1712. In 1707, Boyer records that it was known to the peasants in Auvergne and Perigord. In 1752, attention was again called to the matter, by Butini of Montpelier, and by De La Condamine. Three years later, Tergot inoculated a child four years of age, and one M. Chastellux, aged twenty-four, also submitted to the operation.

In Western Europe

A serious and fatal outbreak of smallpox in Paris in 1763 was attributed partly to inoculation, with the result that the practice was prohibited by the Government. But, five years later, on the recommendation of the medical faculties, this decree was rescinded, and during the latter part of the eighteenth century it was again commonly practised in Paris.

A curious sidelight which shows how the burning questions of the time are reflected even on the fashions of the day, is related in the life of the famous Mlle. Rose Bertin, who was milliner to Marie Antoinette. Mlle. Bertin owed her European reputation to her taste and the ingenuity with which she utilised current events to vary her fashionable designs. In the latter part of the eighteenth century the elaborate coiffeurs affected by ladies of the period were of the most extraordinary description. One of these, known as the "pouf á l'Inoculation," was introduced by Mlle. Rose Bertin to coincide with the inoculation of the young king, Louis XVI, which took place on June 18, 1774. For some time after this interesting event every lady who wished to be in the fashion wore in her hair a miniature model of the rising sun, and a heavily laden olive tree, round whose trunk was entwined a serpent, supporting a club, wreathed with flowers. This device was supposed to symbolise the power of medicine, represented by the snake, to overcome the horrors of smallpox; the rising sun was supposed to symbolise the royal patient, who was a descendant of "le roi soleil," while the olive tree represented the peace and joy of his loving subjects at the successful issue of the operation.

Mlle. Rose Bertin

In Germany, inoculation appears to have been first introduced by Maitland in 1724, who journeyed to Hanover to operate on Prince Frederick of Prussia, and afterwards on the family of a German baron, consisting of eight children. The practice, however, made little progress until 1768, when, after the inoculation of some members of the Imperial family, it became more general. In Berlin it fell into disfavour owing to several deaths from smallpox being attributed to it, and it was not until the end of the eighteenth century that attention was again called to the matter.

In Germany

In Italy, according to De La Condamine, inoculation was known and secretly practised by the Neapolitans, from an early period. He states that it was frequently performed by nurses, who were in the habit of inoculating the infants entrusted to their care, without even the knowledge of their parents, by rubbing the palm of the hand with variolous matter recently taken from a smallpox pustule.

In Italy

During the great epidemic of smallpox in 1754 the practice was introduced into Rome by Peverini, but he encountered considerable opposition, and it was not until some years afterwards that it became common in Italy.

Tronchin is said to have been the first to introduce the practice of inoculation into Holland in 1758, when he performed it on one of his sons; while in Switzerland a lady living in Lausanne inoculated her own child in 1751, and her example was speedily followed by others.

In Holland

Mead, writing in 1765, with reference to inoculation, states: "It was the invention of the Circassians, the women of which country are said to excel in beauty, upon which account it is very common, especially among the poorer sorts, to sell young girls for slaves to be carried away into

In Circassia

the neighbouring parts. When, therefore, it was observed that they who were seized with this distemper (smallpox) were in less danger, both of their beauty and their life, the younger they were, they contrived this way of infecting the body so that the merchandise might bring the greater profit."

In Russia

In Russia, owing to the enthusiasm and interest taken in the subject by the Empress Catherine II, Dr. Dimsdale, a London practitioner, who had become recognised as a specialist in inoculation, was sent for to introduce the practice into that country. He was summoned to St. Petersburg in 1768, and first performed the operation on two boys of about fourteen years of age. The matter for their inoculation had been taken from a child of the poorer classes in the suburbs of St. Petersburg, who was said to be "pretty full of a distinct kind of smallpox." These were followed by four more youths, and a young maidservant, for further trial, and a case of natural smallpox with the eruption in a suitable stage for the purpose was chosen.

These cases proving satisfactory, the Empress herself determined to undergo inoculation, and a child, on whom smallpox had just begun to appear, was selected and taken to the Palace. The operation was performed secretly, and was apparently unattended by any untoward results, as the lady is said to have taken part in every amusement "with her usual affability, without showing the least token of uneasiness or concern, and constantly dined at the same table with the nobility."

Shortly afterwards Dimsdale inoculated the Grand Duke, and for these royal services he was made a Baron of the Russian Empire, appointed Councillor of State, and Physician to Her Imperial Majesty. He was also awarded the sum of one thousand pounds in addition to an annuity of five hundred pounds.

At the request of the Empress, Dr. Dimsdale proceeded to Moscow, where many were desirous of being inoculated.

Dimsdale's method

With respect to his method, he restricted himself to inoculating by means of a lancet, the point of which was slightly dipped in variolous matter taken during the eruptive fever. The lancet was introduced obliquely beneath the superficial skin, making a very tiny puncture. If there were no patients in a proper state to yield the variolous matter, dried lymph was employed. The lancet or a plate of glass or gold was charged with the matter in a fluid state, which was then allowed to dry. When required for use it was held over the steam of boiling water, or a small quantity of water, barely sufficient for dilution, was added to it, and the matter thus moistened was used for the purpose of inoculation.

Some idea of the terrible mortality from smallpox in Europe at the end of the eighteenth century may be gathered from the fact that the average annual death-rate throughout the Continent was two hundred and ten per thousand. During epidemics this was even higher, and in Russia in one year no less than two million persons perished from the disease.

In America

In America, the practice of inoculation appears to have been first suggested at the time of the great smallpox epidemic, in 1721, by Cotton Mather, a clergyman. He was bitterly attacked, however, for recommending such a treatment, insomuch that his life was at one time in danger. In spite of this, he inoculated his son with success, and about the same time Dr. Zabdiel Boylston inoculated one of his children and two of his negro servants.

During the following six months he inoculated two hundred and forty-four persons, with the result, it is stated, that in six there was no effect at all, while six are said to have died in consequence of the inoculation. Boylston describes his method as follows:—

"Take your Medicine or Pus from the ripe pustules of the smallpox of the distinct kind, either from those in the natural way or from the inoculated sort, provided that the persons be otherwise healthy and the matter good. Then take a fine cut sharp tooth pick (which will not put the person in any fear as a Lancet will do in many) and open the Pock on one side and press the boil and scoop the matter on your quill and so on."

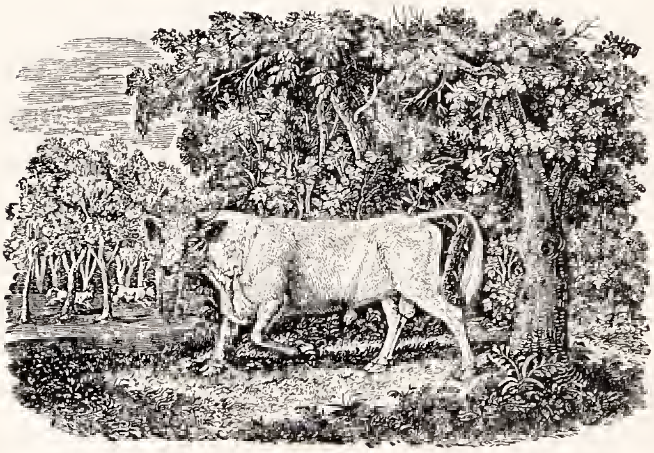
Boylston's experiments excited a great deal of opposition in America, and the practice fell into disrepute after a public meeting of medical practitioners had been called in Boston, where the practice was deprecated as causing the death of many persons, and it was contended that the opcration was likely to prove of most dangerous consequences to those who submitted to it. Inoculation therefore made but little progress in America until 1764, when an epidemic of smallpox broke out in Boston, with the result that three thousand persons were successfully operated on.

In South America, the practice of inoculation was introduced by a Portuguese Carmelite missionary. He appeared to have had no practical experience of it, but was a firm believer in its efficacy, and in 1728, when smallpox was ravaging the neighbourhood of Para, he performed the operation on a number of people with most satisfactory results. His example was successfully followed by another missionary at Rio Negro.

In Mexico

In Mexico, which was ravaged by epidemics of smallpox during the sixteenth century, inoculation was introduced in 1797, at the time of an epidemic in the environs of Mexico City. According to Humboldt, in his "Political Essay on the Kingdom of New Spain," 1808, in the capital of the bishopric of Michoachan, "out of 6,800 people inoculated only 170 died. Several individuals, especially among the clergy, displayed very praiseworthy patriotism in arresting the progress of the disease by inoculation. There were then inoculated in the kingdom between fifty and sixty thousand individuals."

In January, 1804, vaccination was introduced into Mexico from North America, and made rapid progress. "If the vaccine inoculation," says Humboldt, "or even the ordinary inoculation, had been known in the New World in the sixteenth century several millions of Indians would not have perished victims to smallpox." For to this disease the great diminution in the number of Indians in California is to be ascribed.



# CHAPTER III

## INOCULATION IN THE BRITISH ISLES

"Buying the smallpox"

From well-authenticated statements it would appear that a method of inoculation for smallpox, similar to that employed in the East, was known and practised in the British Isles for a considerable period. How, and by whom, it was introduced into Britain we have not been able to trace, but apparently as early as the seventeenth century it was practised in Wales, and was called "buying the smallpox."

According to Williams, writing in 1722, the peasantry in Pembrokeshire had carried on the custom from time immemorial, by rubbing the matter taken from pustules that were ripe on several parts of the skin of the arm, or pricking the parts with pins that had been first infected with the matter. The writer declares, "I cannot hear of one instance of their having the smallpox a second time." He further states, "There is a married woman in the neighbourhood of this place who practised it on her daughter about a year and a half ago, by which means she had the smallpox favourably, and is now in perfect health, notwithstanding she has, ever since, without reserve, conversed with such as have had that distemper this last summer."

School-boys in the district are said to have even inoculated themselves in this way.

An old Welsh custom

Further evidence of the practice in Wales is recorded by a surgeon named Wright, of Haverfordwest. Writing in 1722, he refers to it as "a very antient custom, commonly called 'buying the smallpox,' which I find to be a common practice, and of very long standing. In two large villages near Milford Haven, named St. Ishmaels and Marloes, the oldest inhabitants declared it had been a common practice with them time out of mind, and one, William Allen, who was at that

J. Thurston del.

LADY MARY WORTLEY MONTAGU
Daughter of Evelyn, Earl of Kingston

Born 1689 Died 1762

time ninety years of age, stated that it had been known and used throughout his life, and that he very well remembered his mother telling him it had been commonly done all her time, and that she got the smallpox that way."

In Scotland

There is evidence that in the Highlands of Scotland a method of smallpox inoculation was known about the same period. It was performed by charging worsted threads with the variolous matter, and tying them round the wrists. In the Island of St. Kilda it was customary to rub the matter on the skin of the elbow joint until it was absorbed.

In Ireland

In Ireland, the first record of the practice appears to be in 1723, when a medical practitioner in Dublin introduced it. During that year and the three following, twenty-five persons in all were inoculated, three of whom are said to have succumbed to the disease, and consequently the practice fell into disuse.

In England

In England, there is no credible record of the practice before its introduction by Lady Mary Wortley Montagu, the wife of the British Ambassador to the Ottoman Court in 1717. The accounts of the practice in Turkey, which had been published in the *Transactions of the Royal Society*, by Timoni and Pylarini, in 1713, had caused but little interest, and it was only through the persistent efforts and enthusiasm of Lady Mary, who, to prove its efficacy, had her son inoculated, that serious attention was again directed to the matter in England.

The famous letter which she wrote to her friend, Miss Sarah Chiswell, in 1717, in which she expressed her determination to persuade the physicians of London to practise inoculation, is worthy of quotation in full:—

"Apropos of distempers," she wrote, "I am going to tell you a thing that I am sure will make you wish yourself here. The smallpox, so fatal and so general amongst us, is here entirely harmless by the invention of *ingrafting*, which is the term they give it. There is a set of old women who make it their business to perform the operation every autumn in the month of September, when the great heat is abated. People send to one another to know if any of their family has a mind to have the smallpox. They make parties for this purpose, and when they are met (commonly fifteen or sixteen together), the old woman comes with a nutshell full of the matter of the best sort of smallpox, and asks what veins you please to have opened. She immediately rips open that you offer to her with a large needle (which gives you no more pain than a common scratch), and puts into the vein as much venom as can lie upon the head of her needle, and after binds up the little wound with a hollow bit of shell; and in this manner opens four or five veins. The Grecians have commonly the superstition of opening one in the middle of the forehead, in each arm, and on the breast, to mark the sign of the cross; but this has a very ill effect, all these wounds leaving little scars, and is not done by those that are not superstitious, who choose to have them in the legs, or that part of the arm that is concealed. The children or young patients play together all the rest of the day, and are in perfect health to the eighth. Then the fever begins to seize them, and they keep their beds two days, very seldom three. They have very rarely above twenty or thirty in their faces, which never mark; and in eight days' time they are as well as before their illness. Where they are wounded, there remain running sores during the distemper, which I don't doubt is a great relief to it. Every year thousands undergo this operation; and the French Ambassador says pleasantly that they take the smallpox here by way of diversion, as they take the waters in other countries. There is no example of any one that has died in it, and you may believe I am very well satisfied of the safety of the experiment, since I intend to try it on my dear little son. I am patriot enough to take pains to bring this useful invention into fashion in England; and I should not fail to write to some of

our doctors very particularly about it, if I knew any one of them that I thought had virtue enough to destroy such a considerable branch of their revenue for the good of mankind. But that distemper is too beneficial to them not to expose to all their resentment the hardy wight that should undertake to put an end to it. Perhaps if I live to return, I may, however, have courage to war with them. Upon this occasion admire the heroism in the heart of your friend."

The Eastern method introduced

Lady Mary was not long before she carried her decision into practice, and persuaded Dr. Maitland, who was surgeon to the Embassy in Constantinople, to procure some variolous matter from a suitable subject and to obtain the services of a woman, who was experienced in the practice of inoculation, to use it. In March, 1717, the inoculator, who was an aged Greek woman of Pera, came to the Embassy to meet Maitland, who had the matter ready. In his account of the operation he says: "The good woman went to work so awkwardly and by the shaking of her hand put the child to so much torture with her blunt and rusty needle that I pitied his cries, and therefore inoculated the other arm with my own instrument with so little pain that he did not even complain of it." The disease followed in due course, with the result of over a hundred pustules.

Thus, for the first time, the Eastern method of inoculation was performed on a British subject, an innovation due to the courage of Lady Mary Wortley Montagu, who practically risked her son's life for the purpose.

Four years later, an essay, entitled "A Dissertation on the Method of Inoculating the Smallpox," was published by Dr. De Castro, who advocated arm-to-arm variolation. He recommended physicians to introduce the practice into England, as he found it had always been attended by success.

Lecture on Byzantine and Chinese methods

Shortly after this Dr. Harris delivered a lecture before the Royal College of Physicians in London, in which he described the Byzantine and Chinese methods of inoculation. He also called attention to the method then used at Aleppo of inoculating by means of a thread which had been dipped in the variolous matter, which had been used with success upon four children of the French Consul in that city.

Meanwhile, Lady Mary Wortley Montagu had not been idle, and still enthusiastically carried on her crusade. The inoculation of her son in Constantinople having been successful and attended by no ill effects, in April, 1721, she decided to have her baby girl, a child three months old, inoculated in the same way. She was staying in England at the time, and Dr. Maitland, who had been present at the inoculation of her son, being also in this country, consented to carry it out, and the operation was done in the presence of several of the Court physicians.

In the following year Maitland inoculated the son of Dr. Keith, with favourable results.

The subject excited considerable interest at the time throughout the country and was much commented upon, but the British public, ever conservative in adopting new customs, still regarded the practice with suspicion, and a certain amount of dread, and so for a time it made little progress.

Experiments on criminals

In August, 1722, a suggestion was made to inoculate some criminals, then undergoing imprisonment in Newgate, with variolous matter, and those who submitted were promised a full pardon. Several accepted the offer, and six men were accordingly inoculated by Maitland under the direction of Sir Hans Sloane, on August 9, 1722. Maitland's method of inoculation was to make an incision through the cutis, and apply pledgets

which had been steeped in the variolous matter from ripe pustules. None of the men suffered severely, and only sixty pustules appeared on the one on whom the inoculation produced the most effect. A seventh criminal, named Elizabeth Harrison, a girl of about eighteen years of age, was next experimented on by Dr. Mead, who used the Chinese method of inoculation. It was followed by a mild type of the disease, accompanied by severe pains in the head from the commencement of the eruption, but the girl made a good recovery.

Inoculation of forty individuals in Yorkshire

During the next six months Maitland inoculated only eight persons, but Nettleton, a medical practitioner of Halifax, Yorkshire, who became an enthusiastic believer in the practice, inoculated forty individuals in three months. His method was to first prepare the patient by the administration of a course of aperients, emetics and occasional bleeding. When inoculating, he made two incisions, one in the arm, and one in the leg on the opposite side of the body, and dropped the variolous matter into them. With his later patients he employed another method, which consisted in impregnating cotton wool with the variolous pus, and applying it to the incision for twenty-four hours.

Royal children inoculated

Towards the close of the year 1722, public attention was again drawn to the subject by the announcement that the Princess of Wales had ordered five charity children of the parish of St. James's to be inoculated. The results were successful, and this decided the Princess to have her two young children operated upon in the same way. Although a mild attack of the disease followed, no serious results of the operation occurred, and the practice, thus encouraged by royal favour, received a fresh impetus.

This, however, was soon checked by the announcement of the death of the Hon. William Spencer, and several other cases which terminated fatally from smallpox after inoculation.

Opposition to the practice now sprang up both from physicians and clergymen, who spoke and wrote against it, and a heated controversy speedily developed. The clergy declared the custom to be the outcome of quackery, atheism and avarice, and one divine who preached against it, stigmatised it as "a dangerous and sinfull practice." Maitland, especially, was taken to task in connection with the fatal results which had attended so many persons he had inoculated. To these criticisms the supporters of inoculation replied, and a vigorous discussion followed in the press and in the form of pamphlets published by exponents on both sides.

Opposition to the practice

Notwithstanding this, however, the practice continued to make steady progress in England. Jurin, who published some letters on the subject at this time, stated that, in accordance with statistics, among children born, one in fourteen died in after life from smallpox if uninoculated, while of the inoculated persons only one out of ninety-nine succumbed to the disease. He qualified his recommendation by stating that care should be taken only to inoculate those "who were of good habit of body," and apparently free from any disease.

In 1746, an Inoculation Hospital was established in London, although prejudice still ran high against the practice. Patients, on leaving the hospital, it was said, were often abused and followed in the street by the anti-inoculators, and many had even to remain in the building until night, unable to leave on account of the danger of insult and assault in the streets.

Inoculation Hospital established

In 1747, Dr. Mead, who was at that time at the zenith of his fame as a fashionable and popular physician, published an article in favour of the practice,

and, on behalf of the church, Dr. Maddox, then Bishop of Worcester, also become a powerful supporter of inoculation, and preached a sermon on the subject, which was published and attained considerable popularity.

Inoculation of Prince Edward

At the beginning of the year 1754 public attention was aroused by the announcement that the Prince of Wales had been stricken down by smallpox, and, on the advice of the Court physicians, it had been decided to inoculate Prince Edward and Princess Augusta with variolous matter taken from the royal patient.

This aroused a fresh controversy on the vexed question, and, after some consideration, the following manifesto was published by the Royal College of Physicians in 1754:—

Manifesto by Royal College of Physicians

"The College, having been informed that false reports concerning the success of inoculation in England have been published in foreign countries, think proper to declare their sentiments in the following manner, viz.: That the arguments which at the commencement of this practice were urged against it have been refuted by experience; that it is now held by the English in greater esteem, and practised among them more extensively than ever it was before, and that the College thinks it to be highly salutary to the human race."

In 1757, interest was again revived in the subject by the announcement of a new method of operation, discovered by Robert Sutton, an unqualified practitioner, who soon achieved considerable fame as a successful inoculator. Sutton lived at Debenham, Suffolk, and the success attending his inoculations soon spread throughout the country, insomuch that in the course of eleven years it is stated that he inoculated 2,514 individuals. His practice so increased that he trained his two sons, Robert and Daniel, to assist him, and they eventually opened an Inoculation House near Ingatestone, in Essex, where patients became so numerous that it was difficult to accommodate them in the village.

Sutton's method

Sutton claimed that by the use of certain medicines and treatment, he was enabled to keep the disease contracted after inoculation entirely under his control, and maintained that no fatal results had ever ensued from his method. The details of this he kept a profound secret, and, as his fame increased, so the envy of the physicians of the period was aroused, and every effort was made to try and find out the secret of his success. Samples of the medicines he prescribed were with difficulty obtained, and subjected to analysis both by physicians and chemists, and his patients were plied with all kinds of interrogations after they had passed from under his care, but all without avail. In the end he agreed to communicate his method to any practitioner at a distance away from where he lived, on condition that he received half the profits that accrued, and thus eventually his method became known.

Dietetic and medicinal preparation for inoculation

Patients who desired to be inoculated by him were first kept on a strict dietary for a fortnight, and a certain powder together with a dose of purging salts, was administered during this time. His method of inoculation, as given by himself, was to take a lancet charged with the smallest possible quantity of the unripe, crude or watery matter from the pustules, and then insert it under the cuticle obliquely in the outer part of the arm, between the scarf and the true skin, barely sufficient to draw blood and not deeper than the sixteenth part of an inch. The raised skin was then pressed down by the finger without further application of plaster or bandages. He considered patting or daubing of the matter over the punctured place as unnecessary.

Dr. Dimsdale, who afterwards achieved fame as an inoculator in Russia, as already related, was one of the first to turn Sutton's method to account, and, with some slight alteration, he practised it with great success. Previously, he had applied a piece of thread which had been drawn through a ripe pustule, and well moistened with the matter, to an incision made in one or both arms, but this method he abandoned for one adapted from Sutton's. For nine or ten days before the operation his patients were enjoined to abstain from all animal food and fermented liquor, and to live on a low diet. During this time they were dosed with a powder composed of eight grains of calomel, eight grains of compound powder of crab's claws, and one-eighth part of a grain of tartar emetic. Three doses of this powder were given, one at the commencement of the treatment, the second in three or four days, and the third about the eighth or ninth day.

Adopted by Dr. Dimsdale

In 1766, Burgess called attention to the necessity of preparing the patient, before inoculation, by means of purgatives.

The practice of direct inoculation, however, was still regarded with suspicion by the majority of people, owing to its uncertainty, and it gradually became evident that not only did it fail to exterminate the disease, but actually spread it, and in many cases smallpox was introduced by inoculation into towns which had been free from the natural disease.

There can be no doubt that inoculation lessened the virulence, and, to some extent, diminished the dangers of an attack of smallpox, but smallpox still continued, and, as no precautions against infection were taken, each case only served to spread the disease. One of Maitland's earliest cases, a child of the name of Mary Butt, is said to have infected six servants who had attended her; and in the report of a case recorded by Willan,

Effects of inoculation

of a child whose parents kept a shop in a court consisting of about twenty houses, it is stated that the disease was contracted by seventeen persons who had frequented the shop within a fortnight of the child's recovery, and eight of them died from the disease.

Gradually the practice fell into disuse, and disappeared on the advent of vaccination, direct inoculation by smallpox matter being finally forbidden by Act of Parliament in 1840.

# CHAPTER IV

## THE GENESIS OF VACCINATION

In studying the history of medicine one cannot fail to notice how much we owe to antient customs which have come down to us from traditions of the past, and how many so-called modern discoveries are but re-introductions of practices of remote antiquity.

Thus it was from the old traditions of ignorant cow-herds and dairy-maids that the theory of vaccination of the human being with cowpox as a preventive of smallpox was evolved. From an unknown period farm hands, who had had the care of cattle, had known of a disease among cows which was called "cowpox," and were aware that they were liable to contract the complaint from the animal, especially when milking. It had further been noticed that those who had had the cowpox were not susceptible to the dreaded smallpox, which was so prevalent in England a century or more ago.

Cowherd tradition

Dr. Corlett states that in the time of Charles II, the court ladies and other devotees of fashion looked with envy upon the immunity enjoyed by some of the dairy-maids in Gloucestershire to the pitting of smallpox.

He relates the following curious story of the Duchess of Cleveland (1670), who, it is well known, was a favourite with the king, and celebrated for her great beauty. When joked by the courtiers on the possible loss of her position at court through the disfigurement of smallpox, she is said to have replied that she had nothing to fear, for she had had cowpox.

In Ireland, according to Barry, cowpox had been known as long as smallpox, and about 1750, an aged woman, eighty years of age, stated that she was certain that as long as she could remember the opinion had prevailed that people who had had the cowpox could

BENJAMIN JESTY
From the original oil painting

not take the smallpox, and that many purposely exposed themselves to the former, to protect themselves from smallpox.

This tradition, however, does not appear to have been universal, and in some parts of the country it appears to have been unknown. Jenner believed that it arose as the result of smallpox inoculation, and that the failure in attempting to inoculate smallpox on those who had recently contracted cowpox gave rise to gossip among those who were employed in dairies, and laid the foundation of the popular tradition.

In 1769, Jobst Böse, a Government official in Germany, called attention to the fact that those who had suffered from cowpox, were believed to be protected from smallpox. He states: "I am reminded of the not unknown attacks of cowpox which were prevalent in this country, and to which to this day milkmaids are subject. In passing, I wish to remark that in this country those who have had the cowpox flatter themselves to be entirely free from all danger of getting smallpox, and assert, as I myself, to have heard this same statement made by entirely reliable persons."*

The first record of the tradition being put into practical use is recorded in the papers of Mr. Nash, a medical practitioner who died in 1785, among which were found the following observations:—

First practical use of the tradition

"I never heard of one having the smallpox who ever had the cowpox. The cowpox certainly prevents a person from having the smallpox. I have now inoculated about sixty persons, who have been reported to have had the cowpox, and I believe at least forty of them I could not infect with the variolous virus. The other twenty, or nearly that number, I think it is very reasonable to presume (as they were no judges), had not the real cowpox. It is not my own opinion only, but that of several other

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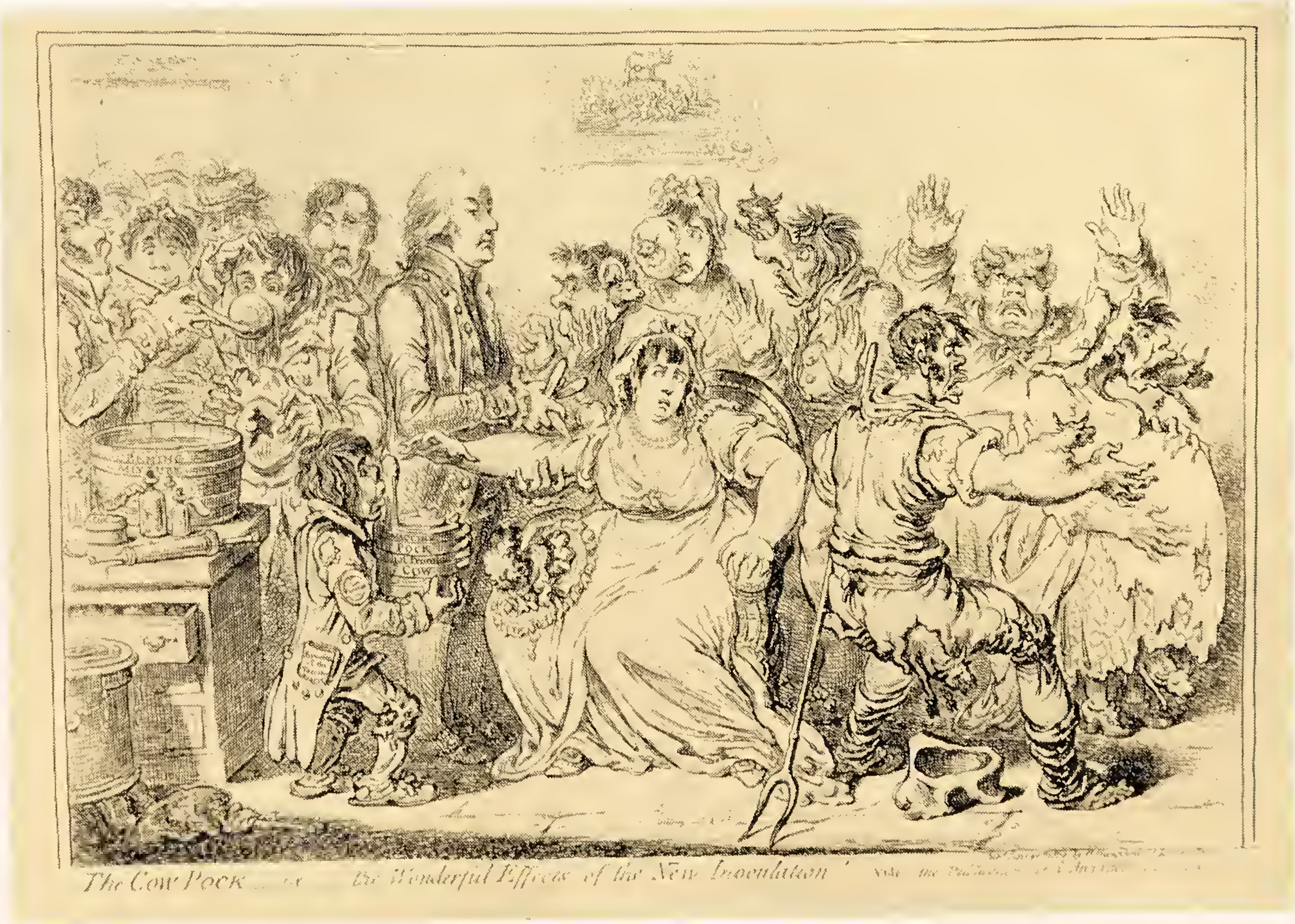
* "General Conversations of Göttingen," Part 39, May 24, 1769


The Cow Pock — or — the Wonderful Effects of the New Inoculation!

"THE COWPOX; OR, THE WONDERFUL EFFECTS OF THE NEW INOCULATION"

From a caricature. 1802

medical gentlemen, that convinces me the cowpox is a prophylactick for the smallpox. My principal intention in publishing being to recommend to the world a method of inoculation that is far superior in my opinion (and I judge it from experience) to any yet made known; therefore I hope and trust, although I have no medical friend to enforce it upon the world, that they will give me so far credit for my assertions as to make the experiment, and then it will sufficiently introduce itself."

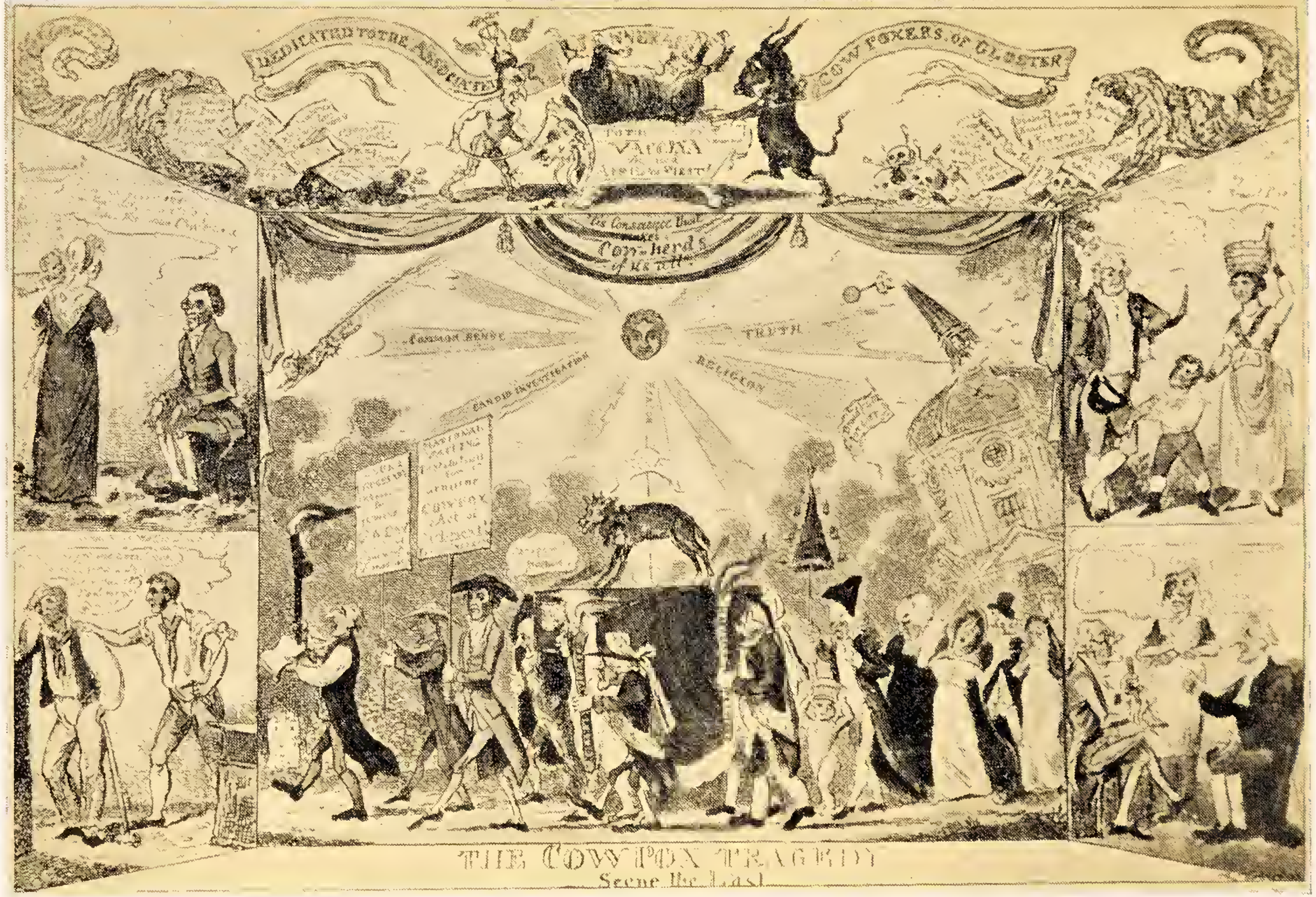
These notes of Nash's were written about the year 1781, and after his death were passed to a Mr. Thomas Nash, and from him to Mr. Robert Keate. According to Crookshank, Jenner was acquainted with Nash.

Rolph's experiences

Another observer who was well acquainted with cowpox was Rolph, who practised for nine years in Gloucestershire about this period. He had noted that out of hundreds of cases that had come under his observation, not a single one had proved either dangerous or fatal. He also states: "There is not a medical practitioner of even little experience in Gloucestershire, or scarce a dairy farmer, who does not know from his own experience, or that of others, that persons who had suffered from cowpox are exempted from the agency of the variolous poison."

Downe records that cowpox inoculation was practised in several cases with success as early as 1771, and he relates the case of a butcher near Bridport, who was inoculated with cowpox matter, by means of a needle, in two or three places on his hand. He afterwards came repeatedly into contact with persons suffering from smallpox, but never contracted the disease.

One of the most interesting incidents, however, in the history of cowpox inoculation is that of Benjamin Jesty, a farmer living at Yetminster in Dorset, who carried on a large business as a cattle dealer. In



"The Cowpox Tragedy"
From a caricature by G. Cruikshank, 1812

the year 1774 he inoculated his wife and three of his children with cowpox matter. Mrs. Jesty was inoculated in the arm under the elbow, and her sons above the elbow, the incision being made with a darning needle, and the virus taken on the spot from the cows of a farmer at Chittenhall, whither Jesty had taken his family. The sons developed the disorder in a favourable way, but Mrs. Jesty's arm became much inflamed.

A farmer inoculates his family with cowpox

As Jesty's experiment became known, the boldness and novelty of it created great interest and caused quite a sensation in the neighbourhood.

The causes that led the country farmer to the idea of inoculation with cowpox matter may best be gathered from his own story, which he communicated to the Rev. Dr. Bell, of Swanage:—

"When the smallpox raged in the vicinity and inoculation was introduced into the village (Yetminster), alarmed for the safety of his family, he bethought himself of this expedient. There had been in his family two maidservants, who, after having the disorder from the cows, and knowing this to be a preventive of the smallpox, had attended, the one her brother, the other her nephew, in the natural smallpox, without taking the infection. This circumstance led Mr. Jesty to communicate by inoculation the disorder of the cows to his family. For this purpose he carried them to the field of a neighbouring farm, and, as has been related, performed the operation on the spot.

"To the other question, how did it happen that this discovery expired at its birth, a ready solution will be found in the character of the ingenious farmer whose pursuits were widely different from those of medicine, literature or science, and in the natural prejudice of mankind strengthened by the alarm which the inflammation of Mrs. Jesty's arm had excited. To such a height was this prejudice carried that a neighbouring surgeon, whose name I have not been able to learn, had almost lost his practice from the bare proposal of following up Mr. Jesty's bold and successful experiment."

Over thirty years afterwards this statement, duly attested, was forwarded to the Jennerian Society in London by Dr. Bell, and it was accepted as satisfactory evidence of Jesty's discovery. The Society invited him to pay a visit to the metropolis for the purpose of having his portrait painted, as the earliest inoculator of cowpox. The worthy farmer accepted the invitation, and, accompanied by his son Robert, whom he had inoculated in 1774, he journeyed to London. According to an account of the visit, written at the time, the pair "met with great attention from the members of the Society, who were much amused with Jesty's appearance and manners. Before he left his country home his family had tried to induce him to attire himself more fashionably for his visit to the metropolis, but without effect. 'I do not see,' said the bluff old farmer, 'why I should dress better in London than in the country,' and so he appeared before the Jennerian Society in his country farmer's clothes, which are described as being peculiarly old-fashioned. In order to prove their statement, Robert Jesty willingly consented to be inoculated for the smallpox, and his father for the cowpox, but neither took effect."

The earliest inoculator of cowpox

Jesty was then invited to sit for his portrait to Mr. Sharpe, an artist, and the picture, when finished, was to be presented to him. But the old farmer proved an impatient sitter, and could only be kept quiet by the artist's wife playing to him on the piano. The portrait when completed was presented, together with a pair of very handsome gold-mounted lancets, to Jesty, and the members of the Jennerian Society signed the following statement, which accompanied the presentation :—

# CHAPTER V

## THE DISCOVERER OF VACCINATION

The close of the eighteenth century saw the dawn of a new era in preventive medicine, by the discovery and establishment of the value of vaccination by Edward Jenner, whose name will ever be remembered as the vanquisher of smallpox, which for centuries before his time had ravaged the world.

Edward Jenner

He was born in the year 1749, at Berkeley, in Gloucestershire, and was the third son of the Rev. Stephen Jenner, the vicar of that place. At the period of Jenner's birth, inoculation was being vigorously advocated as a preventive of smallpox, and when he was but eight years of age, his parents having decided that he should be inoculated, he was promptly put under a preparatory regimen. "For six weeks," he tells us later, "he was bled and purged, and kept on a low diet, and dosed with medicine, and was then removed to one of the so-called inoculation stables, and haltered up with others in a terrible state of disease." Jenner was fortunate to escape with a mild attack, but it affected his health for many years afterwards, and it is probable that the experience he then went through made such an impression upon his mind that he eventually began his investigations on the prevention of the disease.

At the age of thirteen he decided to follow the profession of medicine, and was apprenticed by his father to Messrs. Ludlow, a firm of surgeons in Sodbury, near Bristol, with whom he remained for six years. It was during this period of his apprenticeship that one day a young country woman came to seek medical advice, and, the subject of smallpox having been mentioned, she exclaimed, "I cannot take it, for I have had cowpox." Her reply seemed to have made a deep impression on Jenner, and doubtless set him thinking as to why this should be.

DR. EDWARD JENNER

From an engraving by W. Read

Apparently he never forgot it, but marked it out for a new line of research.

Pupil of John Hunter

On attaining his majority, he came to London and entered as a house pupil with the famous John Hunter, and assisted him in forming his museum. It is said that he often discussed the subject of smallpox with the great anatomist, and on one occasion when relating his hopes and fears of the possibility of substituting vaccination for inoculation, the characteristic reply of the great surgeon was: "Don't *think*, Jenner, but *try*."

Tiring of town life, he resolved, after a time, to return to his native village, and there he settled down as a country practitioner, occasionally visiting Cheltenham, where, on account of his London experience, he was sometimes called in consultation by local practitioners.

and another in spring, to see what he has lost of his fat. Thirdly, when the weather is very cold, and about the month of January, I could wish you would make a hole in one of their bellies, and put the thermometer down into the pelvis, and see the height of the mercury; then turn it upwards towards the diaphragm, and observe the heat there. So much at present for hedgehogs. London, 1778."

Some years later, Jenner married a Miss Kingscote, and his married life was a long and happy one.

In the year 1780, he determined to take up the study of cowpox, and in the month of May in that year he first disclosed to his friend Edward Gardner his future hopes respecting the great object of his pursuit.

Describing his personal appearance about this time, Gardner says: " He was rather under middle size, but

friend, "I have entrusted a most important matter to you, which I firmly believe will prove of essential benefit to the human race. I know you, and should not wish what I have stated to be brought into conversation, for should anything untoward turn up in my experiments I should be made, particularly by my medical brethren, the subject of ridicule, for I am the mark they all shoot at."

"Grease" and smallpox

It was about this period Jenner came to the conclusion that the grease of horses, a disease well known to farriers, was the same as cowpox and smallpox. One day, accompanied by his nephew, George Jenner, when looking at a horse with diseased heels, he exclaimed, pointing to the infected part, "There is the source of smallpox. I have much to say on that subject, which I hope in due time to give to the world."

He satisfied himself that two forms of disease had been hitherto confounded under the name of cowpox, only one of which protected against smallpox. Many cases of failure, he judged, were thus to be accounted for. His next step was to ascertain that the true cowpox itself only protects when communicated at a particular stage of the disease.

Just at this time, however, there was little opportunity of studying cowpox in that part of Gloucestershire. Few cases had been seen, and he had no opportunity of inoculating the disease, and so putting his theories to the test. But he steadily pursued his investigations, and in 1788 he had a drawing made of the hand of a milkmaid with cowpox, which he took with him to London to show Sir Everard Home, who agreed that it was interesting and curious, and the subject began to be talked about in medical circles in London.

While deliberating on the subject of vaccine inoculation, he made some experiments on swinepox, which he believed to be of similar origin to common variolæ. In November, 1789, he inoculated his son

Edward, who was then about eighteen months old, with some swinepox matter which he had collected. He watched the result with the greatest anxiety and interest, and noted that the progress of the disease seemed similar to that arising from the insertion of true smallpox when the attack was slight. No harm apparently resulting to the boy, on April 7, 1791, he inoculated him again, and although a vesicle appeared and there was some erysipelas, it quickly died away, and the child showed no sign of indisposition the whole time.

Jenner's theories tested

In 1796, an excellent opportunity occurred for an important experiment. Cowpox broke out in a farm near Berkeley, and a dairymaid named Sarah Neames contracted the disease. Jenner seized the opportunity and resolved to put his theories to a practical test, and on May 14 he took some matter from a sore on the maid's hand, and inserted it by means of superficial incisions into the arm of James Phipps, a healthy boy about eight years of age. The inoculation succeeded, the result being described as similar to that produced by inoculation with variolous matter. The whole died away, leaving scabs, and subsequent eschars. After a period of six weeks had elapsed, Jenner determined to try the effect of variolous inoculation, and on July 1 he inoculated the boy with variolous lymph by means of punctures and slight incisions, and was delighted to see that no smallpox followed.

These results he communicated in the following letter to Gardner:—

"Dear Gardner,—As I promised to let you know how I proceeded in my inquiry into the nature of that singular disease, the cowpox, and, being fully satisfied how much you feel interested in its success, you will be gratified in hearing that I have at length accomplished what I have been so long waiting for, the passing of the Vaccine Virus from one human being to another by the ordinary mode of inoculation.

"A boy of the name of Phipps was inoculated in the arm from a pustule on the hand of a young woman who was infected by her master's cows. Having never seen the disease but in its casual way before, that is, when communicated from the cow to the hand of the milker, I was astonished at the close resemblance of the pustules, in some of their stages, to the variolous pustules. But now listen to the most delightful part of my story. The boy has since been inoculated for the smallpox, which, as I ventured to predict, produced no effect. I shall now pursue my experiments with redoubled ardour.—Believe me, yours very sincerely, Edward Jenner, Berkeley, July 19, 1796."

To confirm his experiments, and make his discovery certain, he resolved to repeat it before publishing the facts to the world. But again, the disappearance of cowpox in the dairies delayed him, and in the meantime he resolved to prepare a paper on the subject to send to the Royal Society.

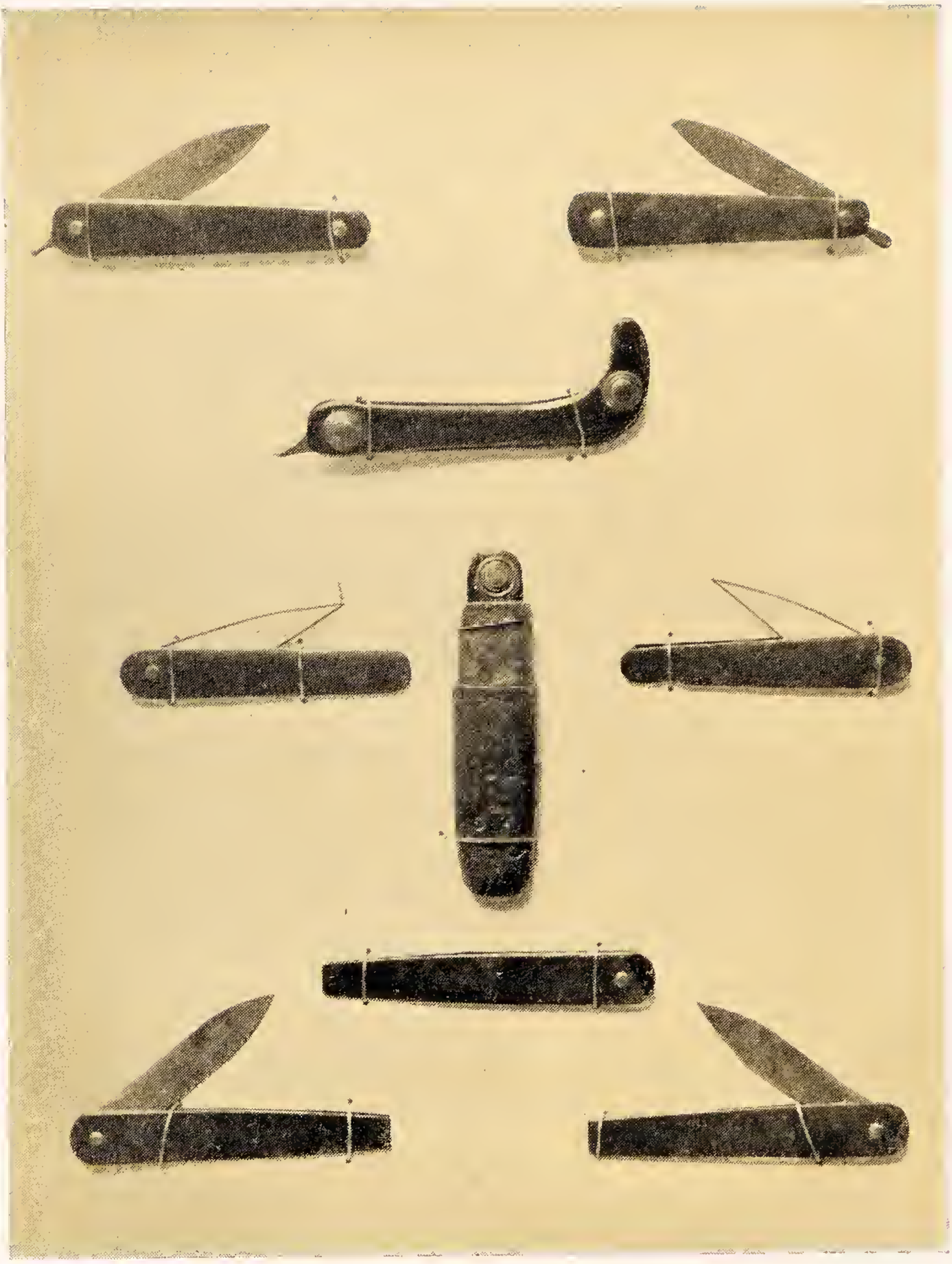
Early in the year 1797, owing to an outbreak of cowpox, an opportunity again occurred, and he inoculated three other persons with success. He then completed his paper, and revised it for publication.

Jenner publishes his paper

He first transmitted the manuscript to the Royal Society, and it was submitted to the Council, but after some time was returned to him, as they apparently thought the evidence was not strong enough to warrant publication in their *Transactions*. Jenner, undaunted, resolved to publish the paper himself, and about the end of June, 1798, it was printed, with additions, in the form of a pamphlet, entitled:

"Inquiry into the Causes and Effects of the Variolæ Vaccinæ, a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the name of the Cowpox."

In this historic pamphlet, which led to such important results, Jenner begins by describing the disease of the horse called by farriers, "the grease," which he



TWO IVORY SCARIFIERS AND SEVEN LANCETS USED BY DR. JENNER IN HIS FIRST EXPERIMENTS

afterwards inoculated with smallpox matter in three places without contracting the disease, and Cline, writing on August 2, 1789, states: "I think the substitution of cowpox poison for smallpox promises to be one of the greatest improvements that has ever been made in medicine. The more I think on the subject, the more I am impressed with its importance."

Jenner's critics

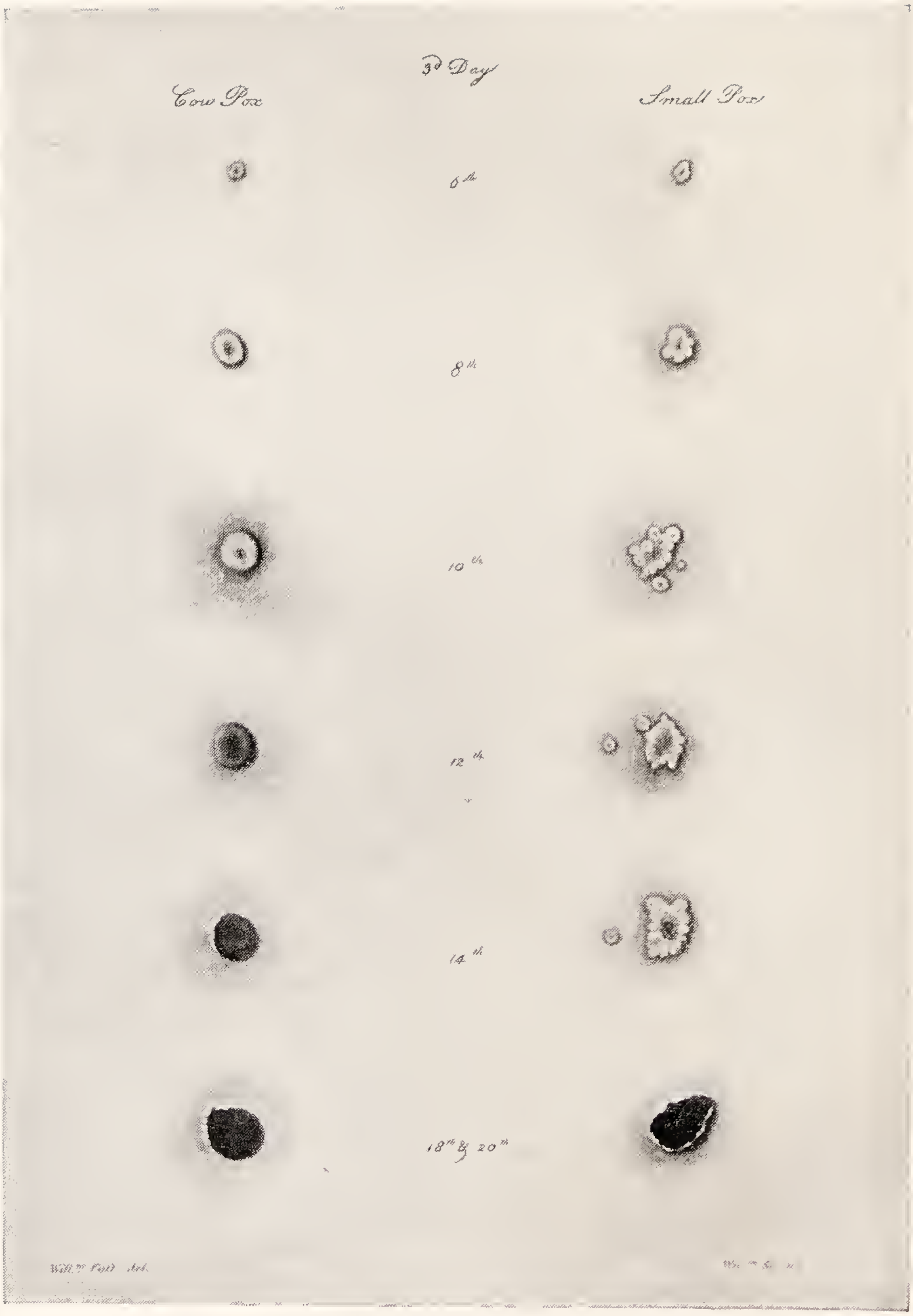
Ingenhousz, a well-known physician and scientist of the time, was the first critic of Jenner's discovery. In the autumn of the same year he opposed the cowpox theory, and cited certain cases where smallpox had been contracted after inoculation by cowpox. Jenner recognised a formidable antagonist in Ingenhousz, whose criticism did a great deal to weaken Jenner's position. The leading scientific and medical men in London next took up the subject, and several questioned the accuracy of Jenner's observations, and stigmatised his doctrines as conjectural and ridiculous.

Others, such as Pearson and Woodville, although adopting Jenner's ideas, endeavoured to exploit them on lines of their own, which proved a failure. Their experiments were attended with somewhat serious results, and for a time stopped the progress of Jenner's work.

Both held important positions, being physicians to the Smallpox Hospital in London, and it is stated that the experiments they commenced to carry out on vaccination were so carelessly performed that they were practically useless. It was further said that the vaccine they used was actually disseminating the disease they wished to prevent.

Jenner comes to London

Jenner, hearing of this, and fearing that their failures would seriously rebound on him, decided to come to London, and in the early part of the year 1799 he came up to the metropolis. He at once set to work to rescue his discovery from destruction, and to expose the errors which had been committed by his imitators. He



ORIGINAL ILLUSTRATION FOR JENNER'S "INQUIRY," REPRESENTING COWPOX AND SMALLPOX PUSTULES ON THE THIRD DAY OF ERUPTION

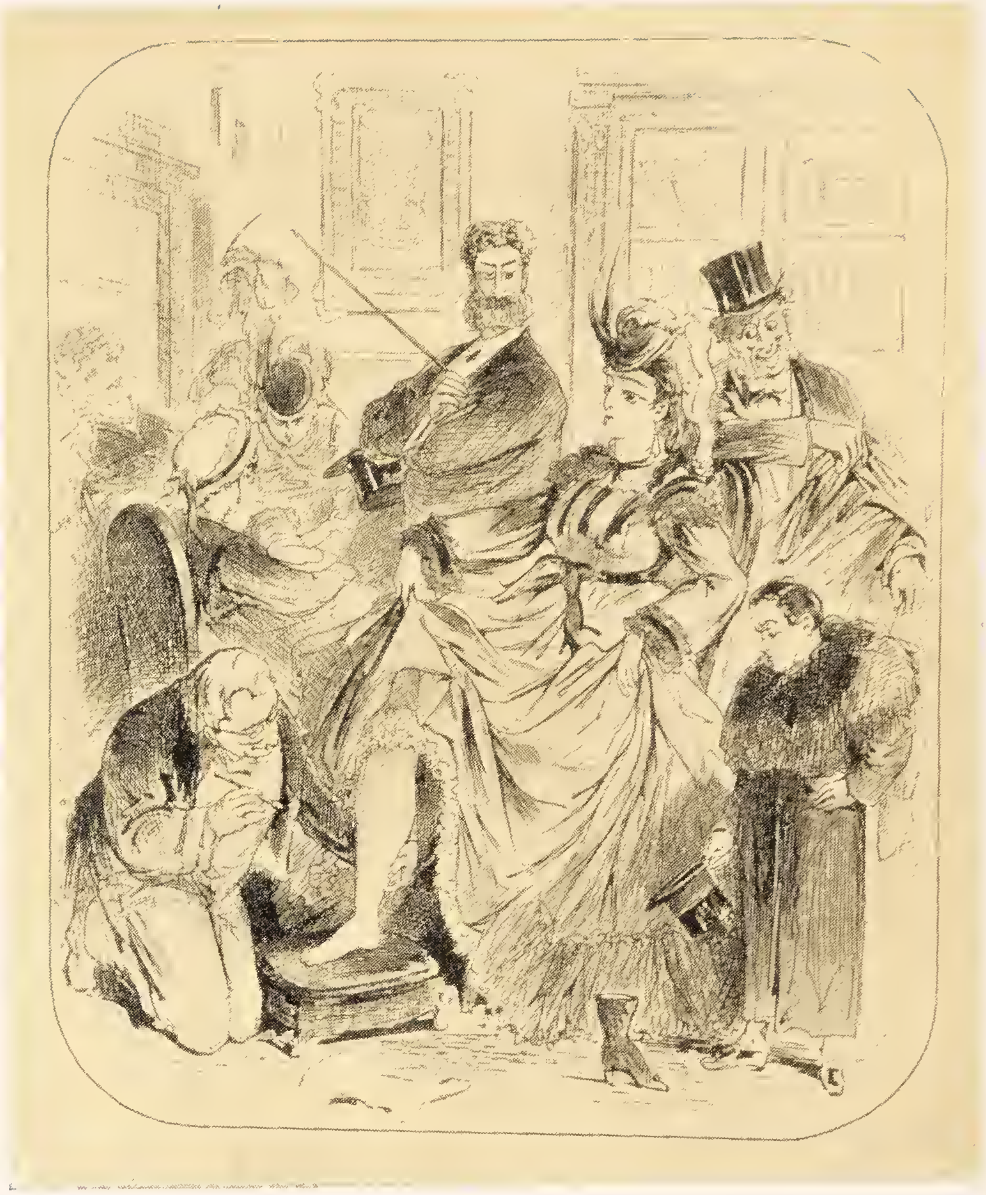
Pearson's projected institution, and was presented by Lord Berkeley to the King, the Queen, and the Prince of Wales, whose encouragement gave him fresh hope and materially aided the spread of the vaccination propaganda throughout the country.

Vaccination in America

The practice of vaccination was soon taken up in America, and was introduced and made known by Dr. Waterhouse, of Cambridge, Massachusetts, who published an article in the *Columbian Sentinel*, in March, 1797, entitled "Something Curious in the Medical Line." Thus, with characteristic enterprise, did the Americans grasp a discovery but just made in the land of its birth, and at a meeting of the American Academy of Arts and Sciences, presided over by John Adams, then President of the United States of America, the subject was attentively considered, and no time was lost in endeavouring to procure a supply of vaccine matter.

This was received in June, 1800, and, on July 8, Waterhouse vaccinated one of his sons, aged five years, this boy being the first person to be vaccinated in America. Finding the results successful as compared with Jenner's experience, he vaccinated several other members of his family, and also subjected them to smallpox inoculation afterwards. Finding the children resisted the disease even when subjected to the most crucial test, Waterhouse exclaimed, "One fact in such cases is worth a thousand arguments."

He was anxious that the benefits of vaccination should be diffused throughout the Continent, and his efforts attracted the attention of Thomas Jefferson, then President of the United States of America, who took a considerable interest in the subject. Jefferson had some of the members of his family vaccinated in August, 1801, and from his own family the President supplied Dr. Gantt with a small quantity of vaccine matter. Thus the seed of vaccination was planted at the capital of the United States.



VACCINATION

"Ah! doctor, I did well in not allowing myself to be vaccinated on the arm . . . it leaves a mark . . . and then my husband finds that I have a fine leg."

"He was not aware of it?"

"He!! Never!"

From a French caricature by Carlo Gripp

In Europe

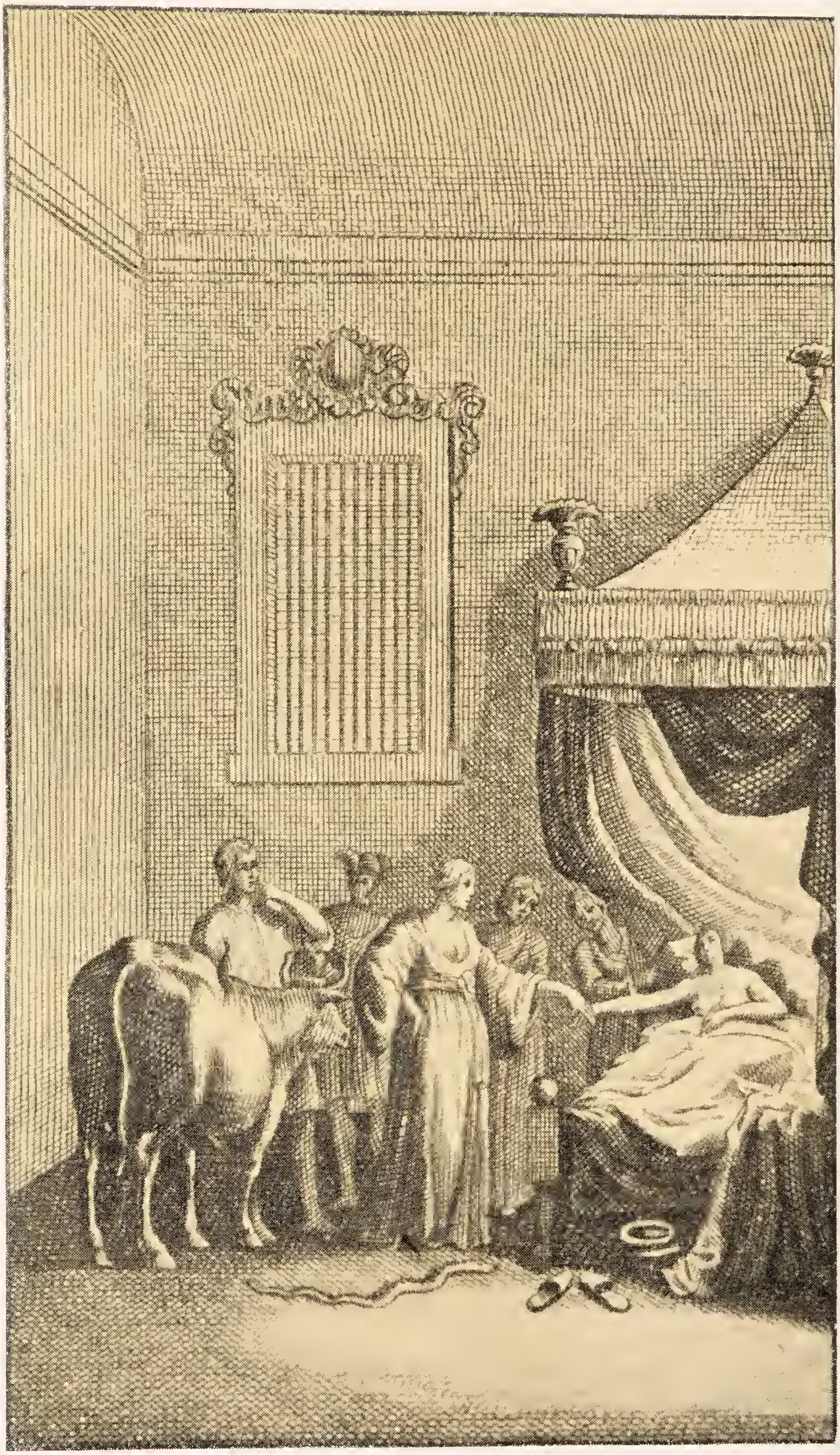
The propaganda next spread over the continent of Europe, and vaccination was demonstrated in Vienna by De Carro in 1799, and its importance once being realised, it was taken up with enthusiasm in Switzerland, France, Italy and Spain. In the latter country, the Government despatched an expedition in 1803 for the purpose of introducing vaccination throughout the Spanish possessions of the Old and New Worlds. The vessel in which the expedition sailed carried twenty-two unvaccinated children, who were to be vaccinated on the voyage in order to preserve the vaccine by passing it from arm to arm. In South America, in Sicily, and Naples, where smallpox was rife, it was received with great enthusiasm, religious processions being formed for the purpose of receiving "the blessed vaccine."

In Italy, Jenner's discovery was successfully exploited by Sacco, of Milan, in 1801. He laboured with unwearied activity, becoming the director of vaccination, and in a few years he had vaccinated 20,000 people. For many of these the vaccine was obtained from an animal with natural cowpox which was discovered in Lombardy after a prolonged search.

In France, Valentin and Desoteux were the first to call attention to the subject, and the practice soon became popular. Liancourt established a Vaccine Institute by subscription, obtaining much financial support from Lucien Bonaparte, who was then Secretary of the Interior.

François Colon, a Paris physician, in order to encourage those who hesitated, had his own son, eleven months old, vaccinated. He also wrote and circulated widely a pamphlet in which he said:—

"I will inoculate gratuitously all the poor, all soldiers and their children, who have not had smallpox, on a simple letter of recommendation from beneficence committees, from different administrations and constituent bodies. I will entertain at my house and attend three intelligent nursing mothers with their



"THE BLESSINGS OF VACCINATION TO MAN"

From an engraving, 1800

children, during the whole period of inoculation. I invite all my colleagues to study my inoculations, and to be convinced by the testimony of their own eyes of the usefulness and advantages of vaccine. I shall be very pleased to enter into correspondence with all the doctors of provinces who wish to know and to propagate this method of inoculation. I will send them some virus vaccine which may be useful to them.

"In order to inspire the public with confidence, I will give to those who wish it a receipt for what I receive as my fees, with a promise to restore it at sight to those who suffer from smallpox after having been inoculated by me. As a guarantee of this promise, I will, if they wish it, sign a deed in the presence of a lawyer, with mortgage on an unencumbered real estate, binding me to refund in the above-mentioned case, as far as I shall be called upon to make good my promise."

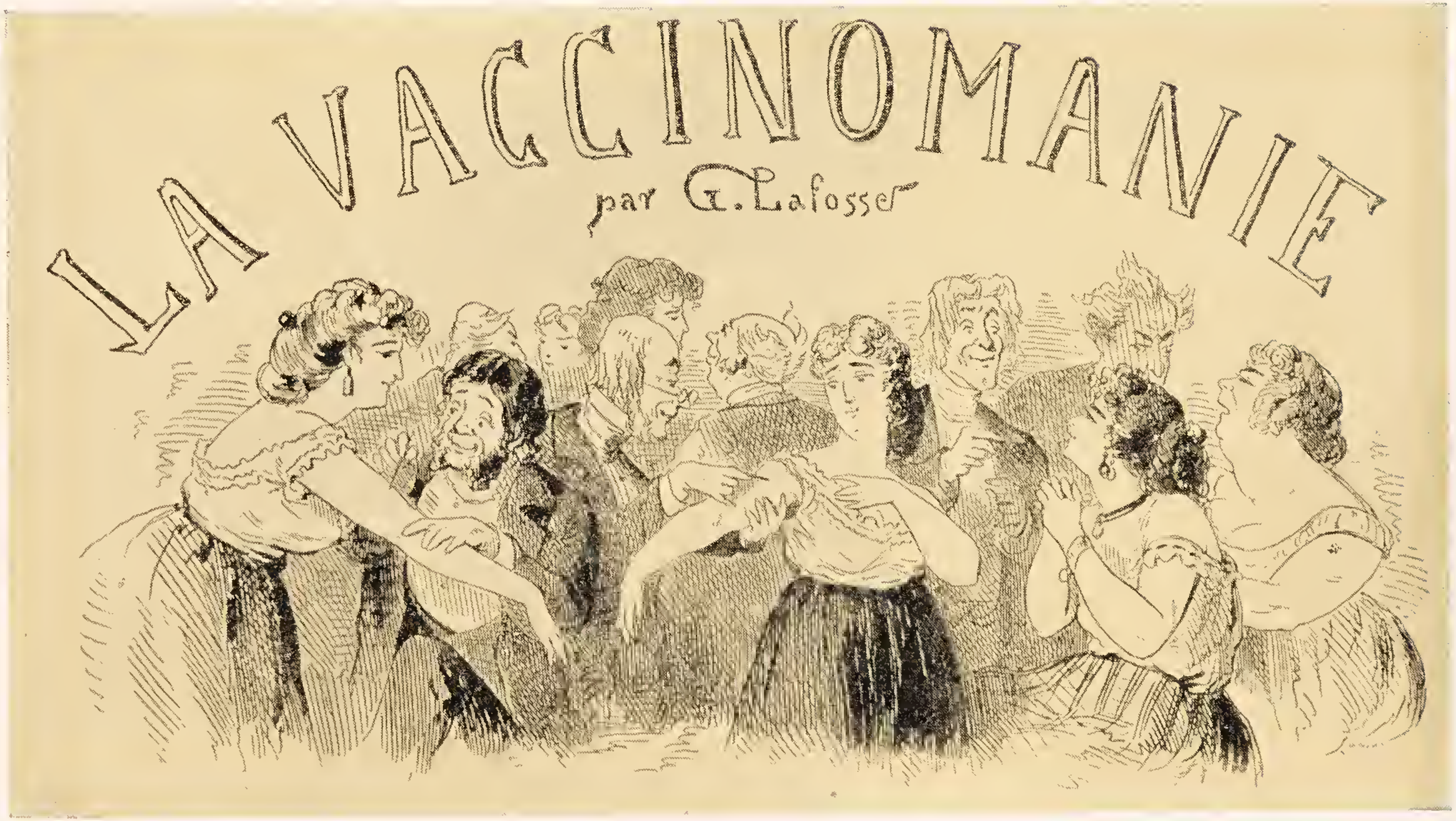
Napoleon's soldiers vaccinated

In January, 1800, Jenner's Treatise was translated into French by the Count de la Roque, and, five years later, Napoleon demonstrated his confidence in Jenner's theories by ordering all soldiers who had not suffered from smallpox to be vaccinated.

The Empress of Russia is interested

Among the most enthusiastic supporters of Jenner's discovery was the Empress of Russia, who urged her subjects to be vaccinated, and who ordered that the first child who submitted to the operation should receive the name of "Vaccinoff," and be educated at the public expense. The young Vaccinoff, after vaccination, was conveyed to St. Petersburg in one of Her Majesty's Imperial coaches, and, after being educated in the Foundling Hospital, received a pension for life. The Empress, in commemoration, afterwards presented Jenner with a valuable diamond ring.

Meanwhile, Jenner's influence and popularity increased. The Emperor of Austria and the King of Spain, at his request, released Englishmen, who had



"Those doctors, those doctors! they see pretty arms, pretty shoulders, pretty . . . . And they make by it, too!"

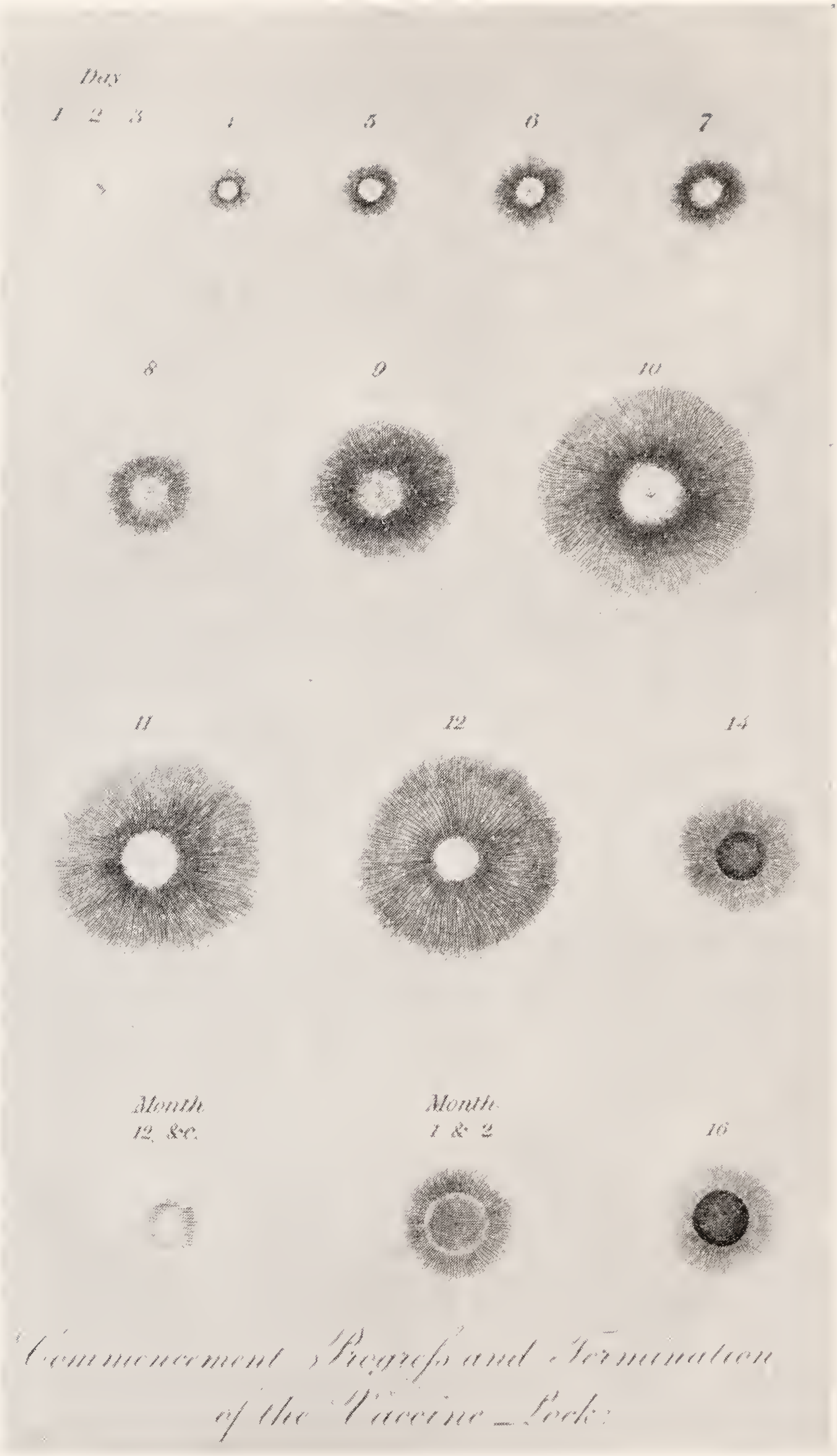
been taken in the wars. In France, where a Dr. Wickham remained a prisoner, Jenner was applied to by one of his friends to present a petition to Napoleon, soliciting the physician's liberation. He readily undertook the task, and drew up a petition to the Emperor at the time when he was exhibiting his greatest animosity towards Britain. The petition was forwarded and safely reached the Emperor. It happened to be handed to him when he was seated in his carriage, together with the Empress Josephine, waiting for the horses to be changed. Glancing at it, he exclaimed to the driver, "Away, away!" But the Empress, examining the paper, said, "But stay, you see from whom this comes—Jenner." Napoleon's manner changed immediately, and he replied, "What that man asks is not to be refused," and so Wickham was released. Napoleon liberated several other prisoners, and even whole families, from time to time, at Jenner's request, and it is stated that he never refused a petition sent by Dr. Jenner, such was the esteem in which he held him.

Prisoners of war released

Napoleon further issued a decree that a hundred thousand francs should be at the disposal of the Minister of the Interior for the propagation of vaccination.

During the years that Jenner had spent upon his research and inquiry, he had expended a considerable amount of money, hoping that his discovery might eventually recoup him and become a financial success. This becoming known to his friends, he was advised to apply to Parliament for a grant, and on December 9, 1801, he journeyed to London to frame a petition, for which he obtained a promise of assistance from Admiral Berkeley. The petition was laid before the House in the March of the following year, and was presented on the following grounds: First, that he had discovered that cowpox was inoculable from cow to

Parliamentary grant to Jenner



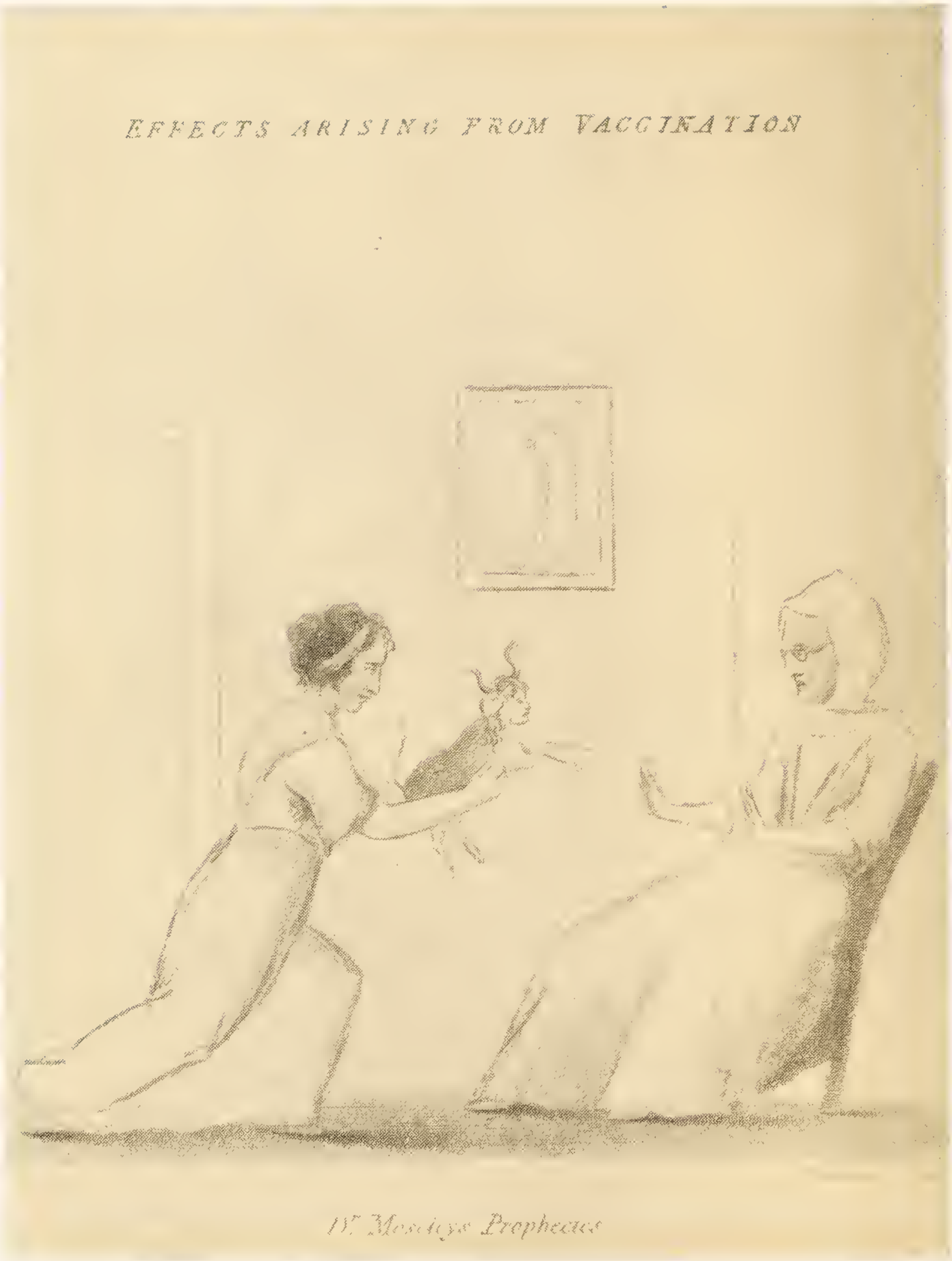
COMMENCEMENT, PROGRESS AND TERMINATION OF THE VACCINE POCK

From the Report of the Royal Jennerian Society. 1816

man; second, that persons so inoculated were for life perfectly secure from smallpox. Jenner added that he had not made a secret of his discoveries, that the progress of smallpox had already been checked, and that he had been put to much expense and anxiety. The matter was referred to a Committee, and in June, 1802, the report was laid before the House, which ultimately granted ten thousand pounds to Jenner, who then left London for Berkeley.

The Royal Jennerian Society

Shortly afterwards, some of his leading supporters in London again took up the matter of forming a Jennerian Institution, for promoting universal vaccine inoculation. The Queen became a patron, the King granting permission for the society to be called "The Royal Jennerian Society for the Termination of the Smallpox," and an influential board of directors and a medical council were appointed. Jenner was made President, and Dr. John Walker appointed Resident Vaccinator. Thirteen stations were opened in London, and in eighteen months they announced that 12,288 inoculations had taken place, and 19,352 charges of cowpox virus had been supplied to different parts of the British Empire and foreign countries. But although the Institution began well, in less than six years its success was on the wane. Jenner disagreed with the chief vaccinator, who resigned his office, and in 1808 the Society practically collapsed. Meanwhile, Jenner had decided to take a practice in London, and for some years settled in Hertford Street, Mayfair. But the results were far from satisfactory, and, after a trial, he returned to his native village. In a letter to one of his friends, referring to the matter, he says, "I have now completely made up my mind with respect to London. I have done with it, and have again commenced the village doctor. I found my purse not equal to the sinking of the thousand pounds annually (which has actually been the case for several successive years), nor the gratitude of the public deserving such a sacrifice. How hard, after what I have done, the toils



"EFFECTS ARISING FROM VACCINATION"
From a caricature, 1806

I have gone through, and the anxieties I have endured in obtaining for the world a greater gift than man ever bestowed on them before (excuse this burst of egotism), to be thrown by with a bare remuneration of my expenses."

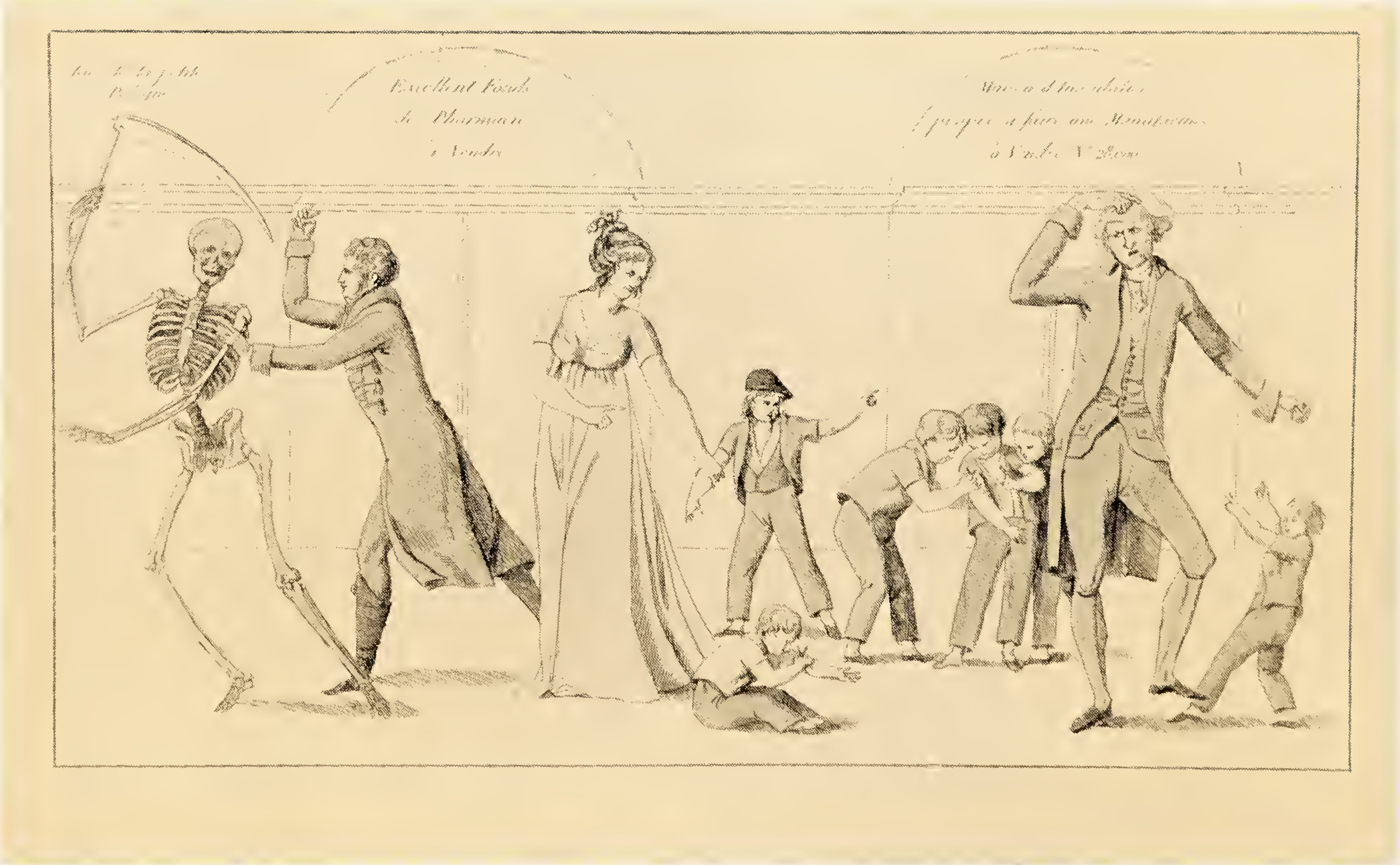
Doubts and difficulties

In the year 1804, failures of the new inoculation multiplied considerably, and even some of Jenner's best friends began to lose confidence. His time at Berkeley was largely taken up in replying to correspondents, and in endeavouring to account for the numerous failures. Jenner had been always aware that smallpox had occurred after vaccination, but that if it did occur he believed that vaccination could not have been properly performed.

He still continued to vaccinate all the poor who applied to him on certain days, so that he had sometimes as many as three hundred persons waiting at his door.

Criticism and caricature

Notwithstanding the success and support that vaccination was now receiving in all parts of the world, there were many who still opposed the practice, and pamphlets, lampoons and caricatures were constantly published by the anti-vaccinators. It was actually alleged by some that those inoculated by cowpox would assume the bovine features of the animals themselves. A Dr. Rowley wrote a long treatise entitled "Cowpox Inoculation no Security against Smallpox Infection; to which are added the Modes of treating the Beastly New Diseases produced from Cowpox." The work is illustrated by the picture of "a cow-poxed ox-faced boy." "Various beastly diseases," asserts the writer, "common to cattle have appeared among the human species since the introduction of cowpox—cowpox mange, cowpox abscess, cowpox ulcer, cowpox gangrene, cowpox mortification, and enormous hideous swellings of the face, resembling the countenance of an ox with the eyes distorted and eyelids forced out of their true



"EVILS OF VACCINATION"

situation. Smallpox is a visitation from God, but the cowpox is produced by presumptuous man; the former was what Heaven ordained, the latter is perhaps a daring violation of our holy religion."

Another writer on the subject recounts the story of a lady who complained that "since her daughter was inoculated, she coughed like a cow, and has grown hairy over her body."

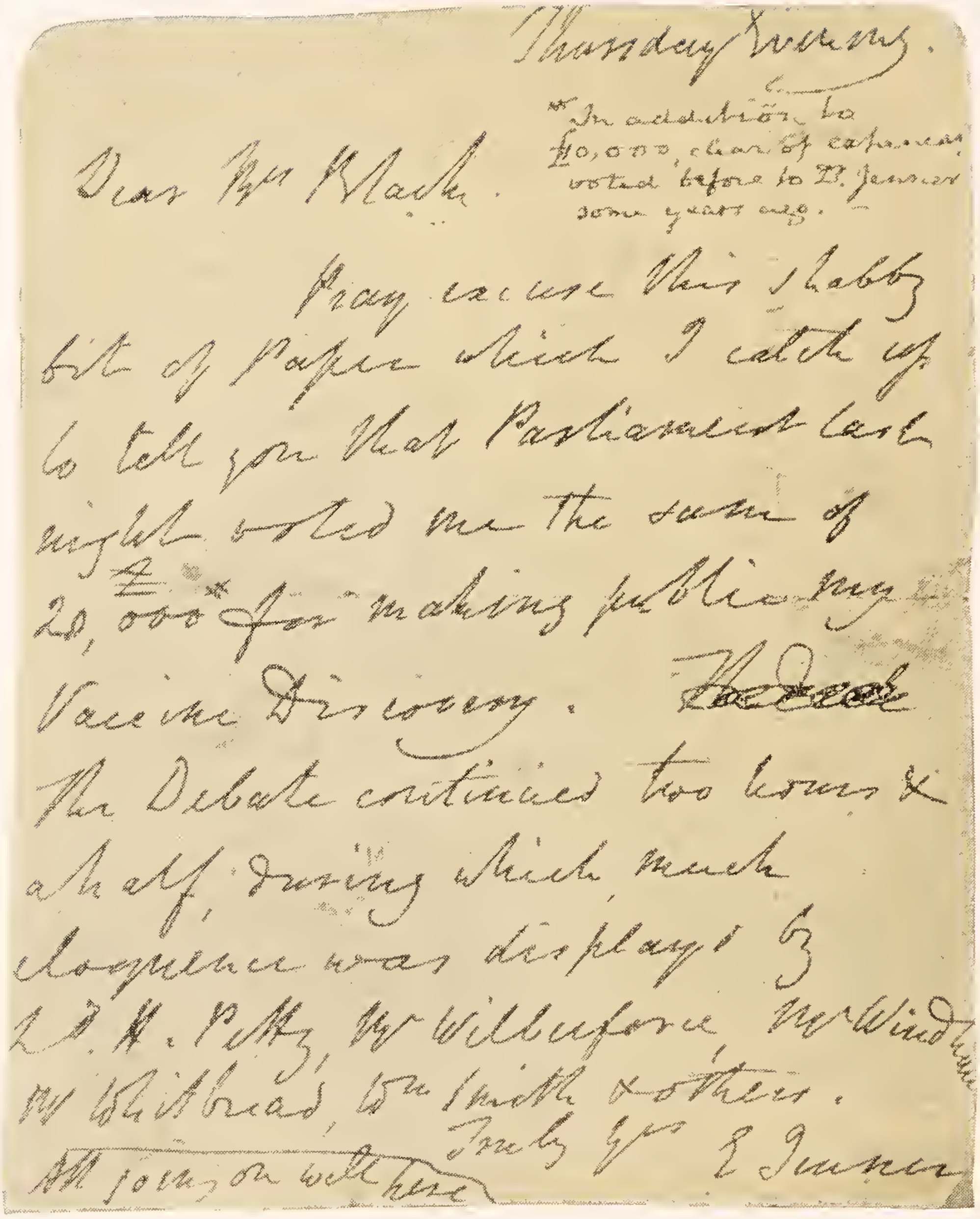
Another anti-vaccinationist declared that the inoculation of the cowpox had been discontinued in a part of the country in which he had been staying, because those who had been inoculated in that manner "bellowed like bulls."

It was stigmatised by others as the "damnest thing ever proposed," and "the most degrading relapse of philosophy that ever disgraced the civilised world."

Honours for Jenner

But, notwithstanding these fulminations, vaccination made steady progress, and every country vied in honouring its discoverer. Jenner was elected a member of nearly all the leading scientific societies in Europe. He was presented with the Freedoms of the Cities of London, Dublin, Edinburgh and Glasgow, and the Medical Society of London conferred on him a gold medal at their anniversary festival, when Dr. Lettsom delivered an oration on vaccination. In 1812, at Berlin, the anniversary of cowpox inoculation was celebrated by a Jennerian feast, and addresses and diplomas poured in upon the discoverer from all parts of the world. The following quaintly worded address was sent to him by the Red Indians of North America:—

"Brother! Our Father has delivered to us the book you sent to instruct us how to use the discovery which the Great Spirit made to you, whereby the smallpox, that fatal enemy of our tribe, may be driven from the earth. We have deposited your book in the hands of a man of skill whom our Great Father employes to attend us when sick or wounded. We shall not fail to teach our children to speak the name of Jenner,



Thursday Evening.

Dear Mrs Black.

* In addition to £10,000, clear of expences, voted before to Dr. Jenner some years ago. —

Pray excuse this shabby bit of Paper which I catch up to tell you that Parliament last night voted me the sum of £20,000* for making public my Vaccine Discovery. ~~Indeed~~ The Debate continued two hours & a half, during which much eloquence was displayd by Ld. H. Petty, Mr Wilberforce, Mr Windham, Mr Whitbread, Wm Smith & others.

Truly Yrs E Jenner

All going on well here

FACSIMILE OF ORIGINAL AUTOGRAPH LETTER WRITTEN BY DR. JENNER TO MRS. BLACK, INFORMING HER THAT PARLIAMENT HAD VOTED HIM £20.000

and to thank the Great Spirit for the bestowing upon him so much wisdom and so much benevolence. We send with this a belt and string of wampum in token of our acceptance of your precious gift, and we beseech the Great Spirit to take care of you in this world, and in the land of spirits."

A grant of £20,000

In July, 1806, the subject of vaccination was again brought before the House of Commons, and the question was considered whether a sufficient reward had been bestowed on the original discoverer of vaccine inoculation. The matter was referred to the Royal College of Physicians, and, having conferred with the other medical faculties in Scotland and Ireland, they reported in favour of a further grant being made to Dr. Jenner, with the result that it was agreed to present him with twenty thousand pounds.

The Government having decided to support vaccination, they felt called upon to found an establishment to carry on the work of the Royal Jennerian Institution, and Jenner was asked to draw up a plan and to prepare an estimation of the cost. The illness of his son necessitated his return to Berkeley, but the warrant for instituting a national vaccine establishment was obtained in his absence, and he was appointed director.

Dissensions, however, crept in at the outset, which ended in Jenner's resigning his post as director, although he continued to give the Institution the benefit of his advice when it was needed.

In 1810, many domestic trials came upon him. The death of his son distressed him so deeply that it materially affected his health. He went to Bath to endeavour to recruit, and on his return he was called upon to attend the Earl of Berkeley, and visited him up to the time of his death. The following year he lost his sister, which was also a great grief to him.

On May 26 in the same year, while in London, he was summoned to attend the bedside of the Hon. Robert Grosvenor, who had developed a serious attack of smallpox. He had been vaccinated by Jenner ten years previously. In four days he became delirious, and the worst symptoms manifested themselves in a very short time. Attended by Sir Henry Halford, Sir Walter Farquhar, and Jenner, he recovered, although a fatal termination had been regarded as inevitable. This case served to revive the agitation against vaccination, and caused quite a panic amongst those who had had their children vaccinated. A fresh outburst of criticism, together with a summons to give evidence before the House of Lords on the Berkeley peerage, seems to have greatly unnerved Jenner, and aged him considerably.

Vaccinated patient seriously attacked

In 1814, he visited London for the last time, when he was presented to the allied sovereigns and the Emperor of Russia on the occasion of their visit to London. The Grand Duchess of Oldenberg, the sister of the Emperor, was very desirous that Jenner should be introduced to His Majesty, and an interview took place. Alexander conversed with him on the astonishing effects of vaccination in Russia, which he declared "had nearly subdued smallpox throughout that country." Jenner replied that he had the highest gratification upon hearing such an important fact from his Majesty. The doctor then presented the monarch with a volume of his own works, which he graciously accepted. A few days afterwards Count Orloff waited on Jenner, and asked him if a Russian order would be acceptable to him, but Jenner replied that he thought this exclusively belonged to men of independent means. The Count expressed his surprise, and Jenner respectfully declined the honour. A little later he had an audience with the King of Prussia, who gave him a pressing invitation to visit Berlin.

Jenner's last visit to London

In the year following he lost his wife, after a long illness, and, stricken with grief, he retired to Berkeley, which place he did not leave again, except for a day or two, until his death.

On January 23, 1823, he wrote in his last letter to his friend Gardner. "I have had an attack from a quarter I did not expect, the *Edinburgh Review*. These people understand literature better than physic, but it will do incalculable mischief. I put it down at one hundred thousand deaths at least. Never was I involved in so many perplexities."

Jenner's death

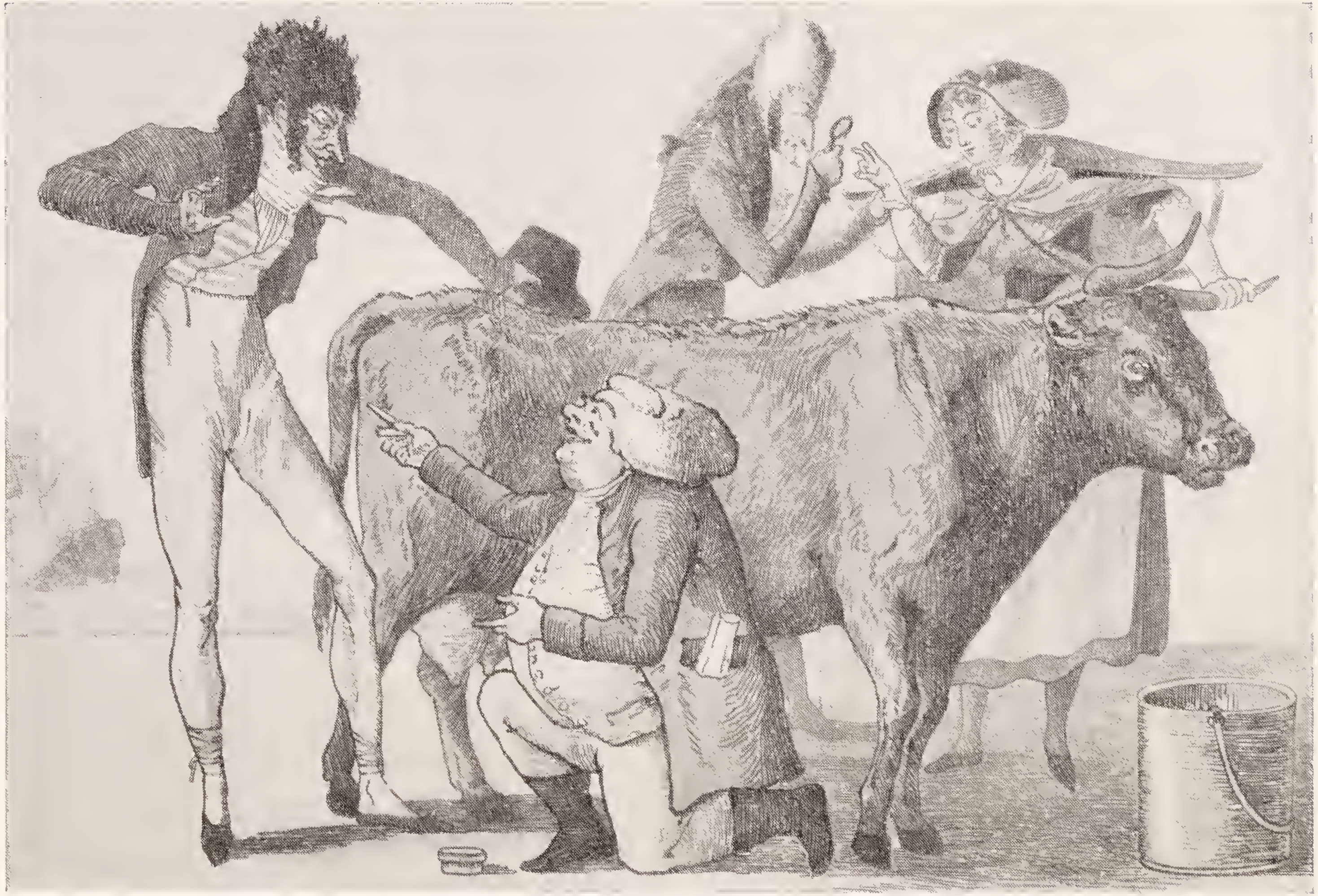
The following day he retired to rest, apparently in his usual health, and the next morning rose and came down to his library, where he was stricken with an attack of apoplexy and paralysis of the right side. He never rallied, and died the following morning, January 26, 1823.

Jenner's achievement

In estimating Jenner's great achievement it should be remembered that his discovery was not so much the fact that persons who had been infected with cowpox escaped variola, but that the matter taken from a human being suffering from cowpox had the power of *protecting another individual* from smallpox.

The lives that this discovery has been instrumental in saving are the most eloquent tribute to his memory, and the principles that he advocated and put in practice still remain the one efficient means of protection against one of the most dreaded scourges that afflict mankind.

It has been well said, that the brilliant discoveries that have since been made in the field of protective inoculation have added lustre to his fame, and his name will ever be remembered as that of one of humanity's greatest benefactors.



"THE ORIGIN OF VACCINATION"

From a French caricature

## CHAPTER VI

## The Progress of the Principles of Vaccination and Inoculation

Many years elapsed before Jenner's principles of vaccination were applied to other diseases. This began with the study of fermentation, the foundation and development of bacteriology.

In 1838, De La Fonde, a Professor at the Alfort Veterinary School, pointed out to his students "little rods," as he called them, which he found in the blood of animals that had died from anthrax, an observation which was destined to have far-reaching results.

Following this, Henle, in 1841, came to the conclusion, on purely theoretical grounds, that the cause of some diseases must be living organisms, and, by a similar induction, Farr applied the word "zymotic" or "fermentive" to them, a term which was soon almost universally adopted.

Micro-organisms and disease

In 1849, Pollender and Brauell also noted certain micro-organisms in the blood of anthrax victims, but it was not until 1861 that these bodies were studied by Davaine, who, describing the thread-like corpuscles which he had seen in the blood of sheep attacked by anthrax, declared: "In the present state of science, no one would think of going beyond these corpuscles to seek for the agent of contagion. This agent," he stated, "is visible, palpable; it is an organised being endowed with life, which is developed and propagated in the same manner as other living beings. By its presence, and its rapid multiplication in the blood, it without doubt produces in the constitution of this liquid, after the manner of ferments, modifications which speedily destroy the infected animal."

Further investigations proved the correctness of Davaine's theory, viz., that most forms of contagious disease were the result of fermentative processes,

LOUIS PASTEUR

Born 1822. Died 1895

analogous in all respects to the fermentation which takes place in wine or beer.

Pasteur and his work

It is very largely to the brilliant researches of Louis Pasteur, and his investigations into the causation of disease, that we owe the foundation of the scientific era of inoculation which produced such remarkable developments in recent times. Born on December 27, 1822, at Dôle, in France, he was the son of a tanner who carried on business in that town. He was sent for a short time to a boarding school in Paris, and afterwards to a college at Arbois, where his father hoped he would eventually become professor. In 1842, he took his degree as Bachelor of Science at Dijon, and afterwards went to Paris to attend classes at the Sorbonne, where he studied under the celebrated Dumas. In 1848, he was appointed Professor of Physics at Dijon, and six years later became Professor and Dean of a new faculty of science at Lille, where he commenced his famous researches on fermentation which led to such important after results. In 1865, he was sent, on the recommendation of Dumas, to Alais, to investigate the silk-worm disease, which had seriously affected the silk industry of France. This he brought to a successful conclusion.

In 1877, he began to investigate anthrax, or charbon. This mysterious scourge was then causing terrible ravages among sheep in France, and animals stricken down by the disease died within two hours.

Early results in anthrax

The starting-point of Pasteur's investigation of anthrax was, that not only fermentatives, but also disease processes, were due to the action of bacteria. He declared that anthrax was due to this cause, and set out to prove that it was possible to modify the virulence of a pathogenic organism by artificial means, so that it no longer produced fatal results, and that this attenuated virus protected against the fatal form of the disease.

DR. CHAMBERLAND

In the summer of 1879, Pasteur interrupted his researches on anthrax to investigate a sudden epidemic that had broken out in the farmyards of France, known as chicken cholera.

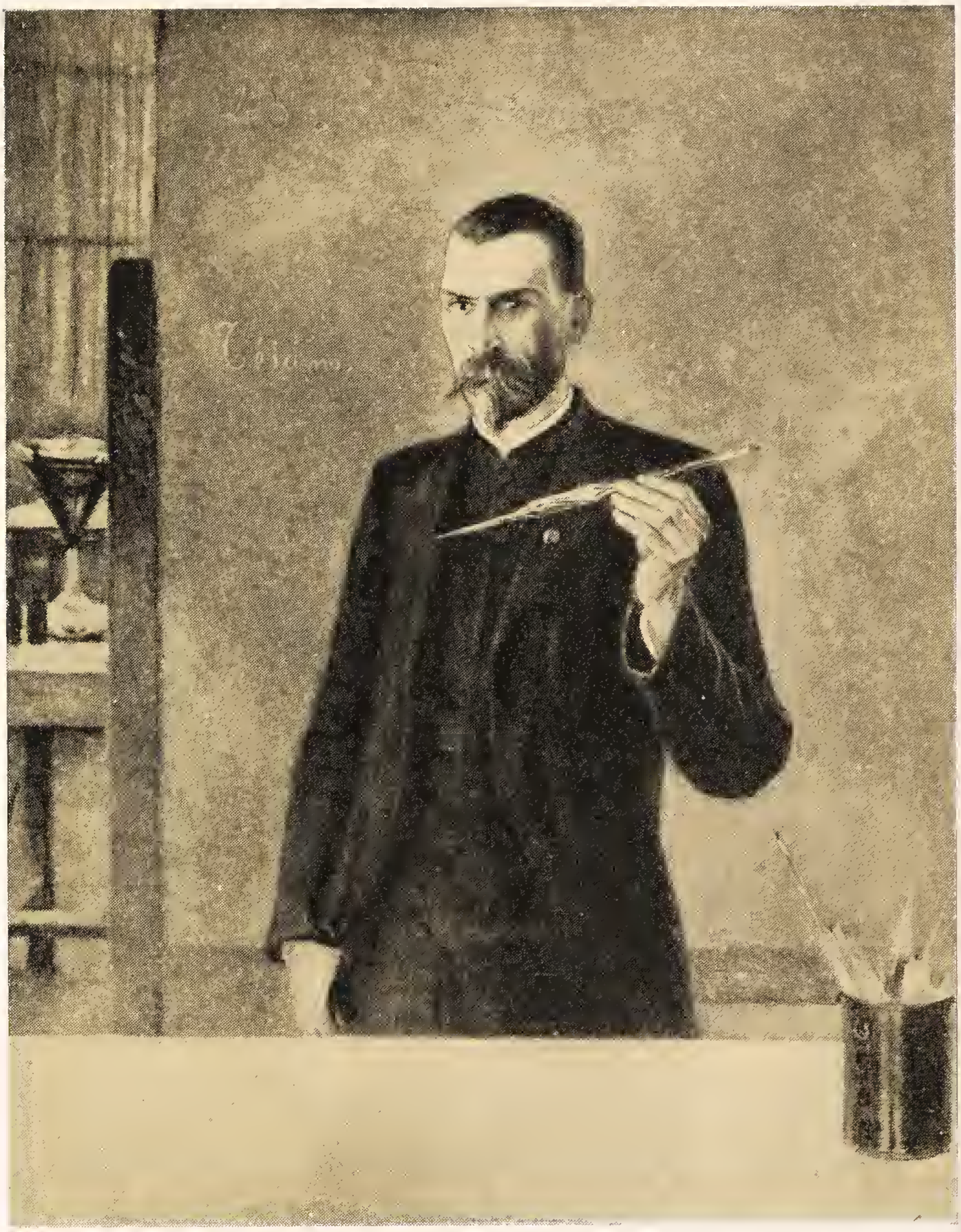
The microbe of chicken cholera

As far back as 1869 Moritz, an Alsatian veterinary surgeon, suspected that this disease was caused by some micro-organism, and nine years afterwards Perroncito made a drawing of an organism which he discovered in a fowl that had died from the disease. Toussaint studied it, and demonstrated that this microbe was indeed the cause of virulence in the blood, and sent the head of a cock that had died of chicken cholera to Pasteur.

Inoculation with attenuated virus

Pasteur at once began an investigation of the subject, and discovered that a micro-organism was the specific cause of the disease. He further found that it could be propagated outside the fowl's body in sterilised material, and after two generations of such cultures the virus did not lose its specific character or intensity if each culture was made from the preceding one at short intervals. If a few days were allowed to elapse, he noted that the virus became weaker, and it could then be obtained of various degrees of virulence, some fatally strong, others so attenuated that a bird inoculated with it had a slight illness only, but this trifling effect protected it against subsequent inoculation with the stronger virus. His further researches showed that the virus could be cultivated of each degree of intensity without altering its strength, that the weakest could be cultivated as well as the strongest, and that of any intermediate strength equally; they threw an entirely new light on certain phenomena, and paved the way to his further remarkable discoveries.

In 1881, he resumed his search into the cause of anthrax, and in February he was able to announce his discovery of a vaccine to protect animals against



DR. ROUX

that disease, which aroused considerable interest throughout Europe.

The Melun Agricultural Society hastened to give the scientist facilities to prove his assertions, and invited Pasteur to organise public experiments on his method of preventive vaccination for anthrax in the neighbourhood of Melun, Fontainebleau and Provins.

First public experiments with anthrax vaccine

Pasteur accepted the proposition, and the Melun Agricultural Society put sixty sheep at his disposal, twenty-five of which were to be vaccinated by two inoculations at twelve or fifteen days' interval, with some attenuated anthrax virus. Some days later these twenty-five, and also twenty-five others, were to be inoculated with some very virulent anthrax culture. "You will see," wrote Pasteur with confidence, "the twenty-five unvaccinated sheep will all perish, and the twenty-five vaccinated ones will survive."

On May 5, 1881, the day appointed for the test, Pasteur, accompanied by his assistants Chamberland and Roux, whose names have since become famous in the world of science, arrived at the farm Pouilly-le-Fort, near Melun, where a great throng of physicians, apothecaries, veterinary surgeons and agriculturists had assembled. The sheep to be vaccinated and those left unvaccinated for the test were separated under a large shed, and each of the former received an injection consisting of five drops of the bacteridium culture, which Pasteur called the first vaccine, on the inner surface of the right thigh, by means of a small Pravaze syringe. A second inoculation was not made till a fortnight afterwards, with a vaccine which, though still attenuated, was more virulent than the first. On the last day of the month the third and last inoculation, with very virulent anthrax culture, took place, this time on fifty sheep and ten cows, vaccinated and unvaccinated. Pasteur, writing to his son-in-law, said: "On June 5 at the latest, the final result will be known, and that should be twenty-five survivors out of twenty-five sheep and six cows. If this success is complete this will be one of the finest examples of applied science in this century, consecrating one of the greatest and most fruitful discoveries."

The result was in every way satisfactory, as Pasteur had predicted. The sheep that had been originally vaccinated remained alive, while the unvaccinated ones died.

On June 13, Pasteur communicated the result of this great control experiment to the Académie des Sciences, and said: "We now possess virus vaccine of anthrax capable of preserving those inoculated from the dread disease, without being in itself deadly."

The French Government, desirous of recognising his discovery, offered him the Grand Cordon of the Legion of Honour, but Pasteur would only accept it on the condition that his able assistants, Roux and Chamberland, were to share in the honour, and to this stipulation the Government acceded.

Before even the completion of the discovery of the anthrax vaccine the great scientist had embarked on an investigation of still greater importance, namely, that into the cause and prevention of hydrophobia.

The subject of this dread disease, which goes back to a period of great antiquity, was one which has baffled scientific investigation throughout the centuries.

Hydrophobia in antiquity

Celsus described it in Roman times, and remarked on the patient being tortured at the same time by thirst and an invincible repulsion towards water. He recommended suction of the bitten part by means of a dry cupping glass, and afterwards the application of the actual cautery, or of strong caustics, a method of treatment which remained in vogue down to the nineteenth century. Galen also described the disease, and recommended the excision of the wounded part as the chief protective treatment. In the Middle Ages

certain Saints, such as St. Hubert in Belgium, were supposed to effect miraculous cures, and sea-bathing, or the throwing of the patient into a lake or pond, was supposed to effect a cure.

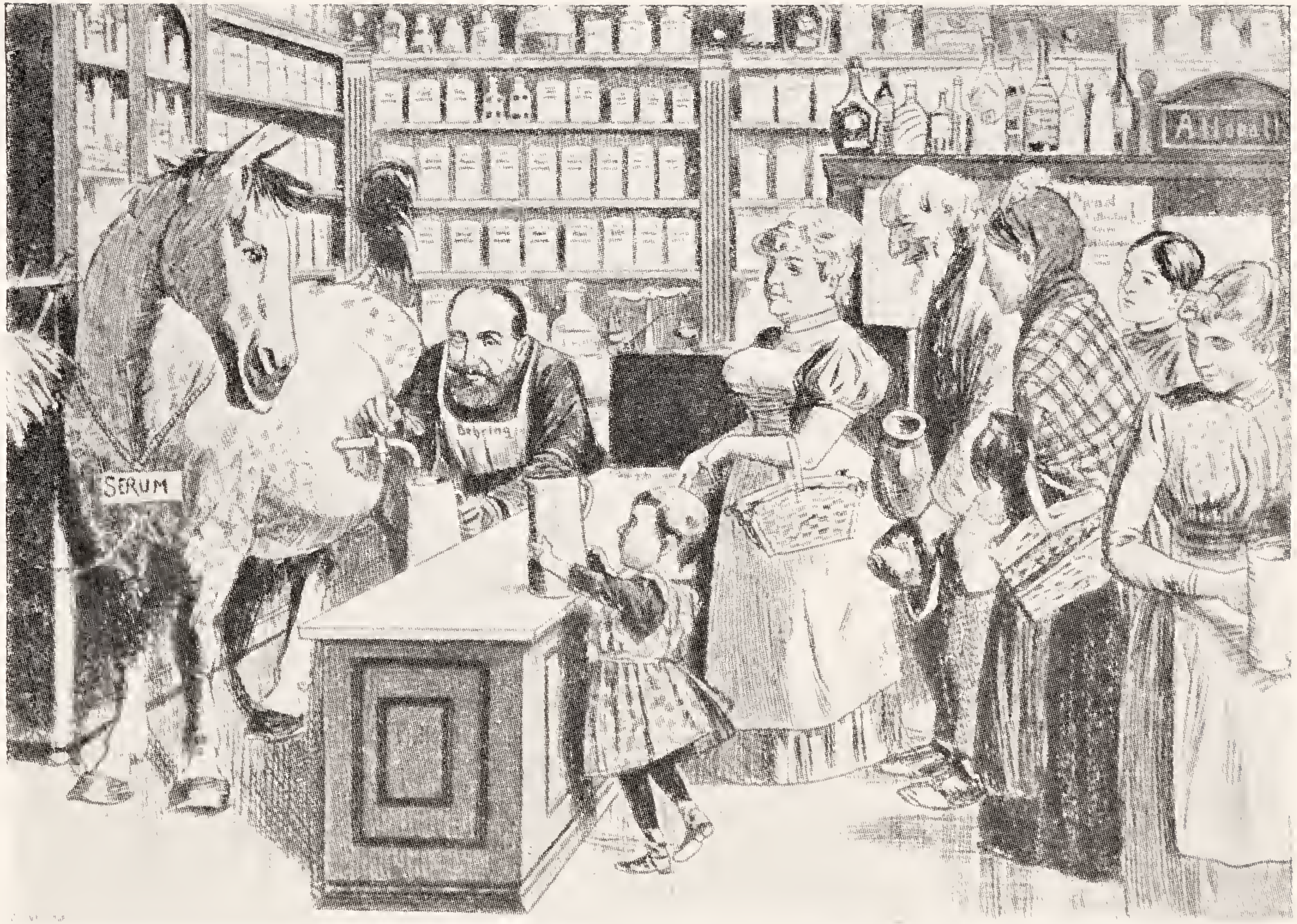
Leroux's method of treatment

In 1780, a prize was offered for the best method of treating hydrophobia in France, and it was awarded to Surgeon-Major Leroux, who wrote a dissertation recommending cauterisation as the best means of treatment. All methods and remedies, however, proved unavailing, and down to the latter part of the nineteenth century, hydrophobia was regarded as hopelessly incurable, and the mortality from rabies was gradually increasing. Practically every person in whom the symptoms of hydrophobia were once developed, might be regarded as condemned to death without hope of a reprieve.

Pasteur's attention was first drawn to the subject in 1880, by Bourrel, an old army veterinary surgeon, who had long been trying to discover a remedy for the disease. He had suggested, as a preventive measure, that the teeth of dogs should be filed down so that they could not bite into the skin.

Pasteur's experiments commence

Bourrel kept a number of animals in kennels, and two suffering from rabies he brought to Pasteur's laboratory. On December 10 of the same year, while Pasteur was still planning his investigations, he was notified by Professor Lannelongue that a little child, five years of age, who had been bitten by a dog on the face a month before, had been admitted to the Hôpital Trousseau, with symptoms of hydrophobia. The child died after twenty-four hours of horrible suffering, suffocated by the mucus which filled the mouth. Pasteur seized the opportunity, and, hurrying to the hospital with all speed, collected some of this four hours after the child's death. Adding a small quantity of water to the mucus, he inoculated some rabbits with the liquid, and they died in less than thirty-six hours.



"SERUM DIRECT FROM THE HORSE, FRESHLY SUPPLIED"

The saliva from these he injected into other rabbits, who succumbed almost immediately. On examining the blood of the latter under the microscope, he discovered a micro-organism, which he cultivated in veal broth, and then inoculated rabbits and dogs with the culture. After their death, a microscopical examination of the blood revealed the same organism.

Following these experiments he made several attempts to inoculate rabies direct to other rabbits through the medium of the saliva of a mad dog. The great danger involved in carrying this out can be imagined from the description given of the following scene. On one occasion two assistants at Bourrel's kennels undertook to drag a mad bulldog suffering from rabies, and foaming at the mouth, from the cage in which it was kept. They seized it by means of a lasso, and, stretching it on a table, held the struggling and ferocious animal down while Pasteur, with undaunted courage, drew off a few drops of the deadly saliva by means of a glass tube held between his lips.

Hydrophobia and the grey cortex

But uncertainty still followed the inoculations even of this medium, and the incubation was very slow, so that some other means, which would be more rapid and certain, were sought for. Roux, from observation of several rabid animals in the laboratory, concluded that the mad fury of a rabid dog excited the grey cortex of the brain, and mentioned the same to Pasteur, who decided to follow the matter up. On making the next post-mortem on a mad dog, he uncovered the brain, and with a sterilised tube removed a particle of the substance, which he mixed with sterilised water. With this liquid he inoculated several animals, who rapidly succumbed to hydrophobia, and from this experiment he concluded that the seat of the rabid virus was not in the saliva only, as it was previously thought to be, but was also in the brain. He resolved to confirm this by a long series of experiments, and on the termination of these he decided to submit his results to be verified by a Commission. This was duly constituted by the French Government, in May, 1884, and a plan of work was immediately formulated. A large number of dogs were submitted to control experiments, which were continued for several months, and in August of the same year the Commission reported to the Minister of Public Instruction that the first series of experiments had been carried out with the most satisfactory results, and they desired that further research might be prosecuted on a larger scale. This was agreed to, and a suitable place was found in the Park Villeneuve l'Etang, near St. Cloud.

On March 28, 1885, Pasteur, writing to a friend, states, "I shall be busy for some time, settling down, or rather settling my dogs down, at Villeneuve l'Etang. I also have some new experiments on rabies in hand, which will take some months. I am demonstrating this year that dogs can be vaccinated or made refractory to rabies, after they have been bitten by mad dogs. I have not yet dared to treat human beings after bites from rabid dogs; but the time is not far off, and I am much inclined to begin by myself—inoculating myself with rabies, and then arresting the consequences; for I am beginning to feel very sure of my results."

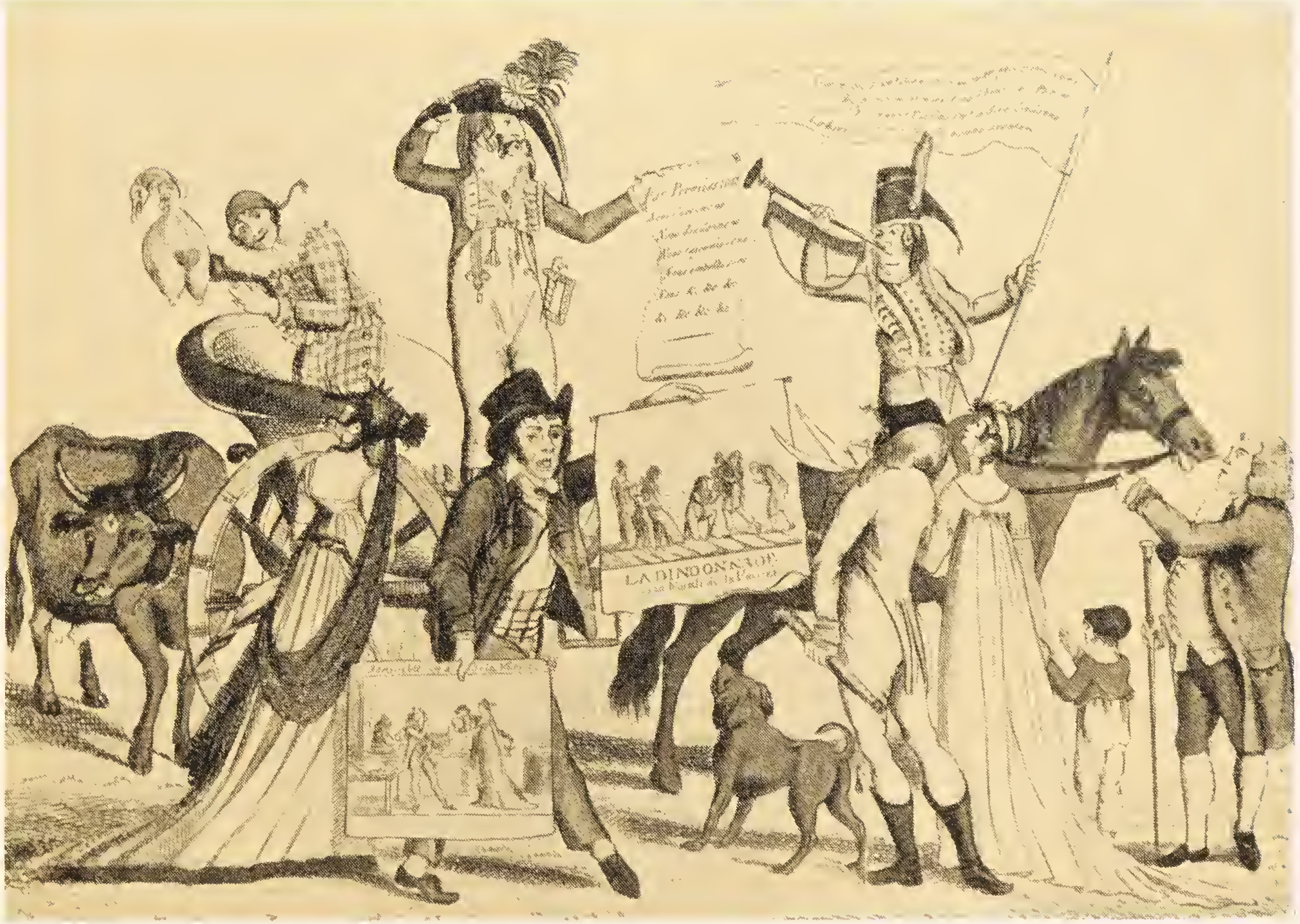
Kennels established at Villeneuve l'Etang

In May everything was ready at Villeneuve l'Etang for the reception of sixty dogs, where they were accommodated in immense kennels. Besides this, forty other dogs were under experiment at Rollin, and fifteen others at Bourrel's. Two series of experiments were then carried out on these animals, the first consisting in making the dogs refractory to rabies by preventive inoculation and the second in preventing the onset of rabies in dogs bitten or subjected to inoculation. But months went by without bringing about any satisfactory conclusions.

The matter was brought to a crisis by an unexpected incident. On July 6, 1885, a little boy named

Boy inoculated

Joseph Meister, nine years of age, was brought to Pasteur's laboratory by his mother. He had been terribly bitten two days before by a mad dog at Meissengott. The wounds had been cauterised by a local doctor, who had advised the mother to bring her child to Paris. Pasteur was torn by conflicting emotions, and the sight of the child, who suffered so much that he could hardly walk, caused him to decide that something should be done. He made arrangements for the comfort of the poor mother and her son, and told them to see him again at five o'clock, Meanwhile, he communicated with his colleagues. Vulpian and Grancher, and they came to the laboratory that evening and examined the boy's wounds, some of which were very deep. In the end they concluded to inoculate the boy immediately. The liquid chosen was fourteen days old, and had quite lost its virulence, and was prepared from some fragments of medulla oblongata. Pasteur had a bedroom prepared for the mother and child close at hand, and the little sufferer soon became happy with the many animals that the scientist kept about the place for experimental purposes. The first inoculation was followed by others, gradually increasing in strength. "All is going well," wrote Pasteur, on July 12, "the child sleeps well, has a good appetite, and the inoculated matter is absorbed into the system from one day to another without leaving a trace. It is true that I have not yet come to the test inoculations which will take place on Tuesday, Wednesday and Thursday. If the lad keeps well during the following three weeks, I think the experiments will be safely concluded." Thus, for days, Pasteur became a prey to anxiety, going through in succession hopes, fear and anguish in his desire to save the child from a terrible death. His wife states he could no longer sleep, visions came to him of this child struggling in the last mad paroxysms of hydrophobia. At length the treatment was complete, and Pasteur, yielding to persuasions to take a rest, left the boy in the hands of Grancher



"VACCINATION ON TOUR"

From a caricature, 1799

for a short time, and went into the country, where he lived in constant expectation of the daily report from Paris. But these were all favourable, and the boy seemed to be completely well.

On October 21, Pasteur made his statement on the case before the Académie des Sciences. By this time three months and three days had passed, and no ill had resulted to the child.

Success reported to the Académie des Sciences

Bouley, at this historic meeting, remarked, "We are entitled to say that the date of the present meeting will remain for ever memorable in the history of medicine, and glorious for French science; for it is one of the greatest steps ever accomplished in the medical order of things—a progress realised by the discovery of an efficacious means of preventive treatment for a disease, the incurable nature of which was a legacy handed down by one century to another. From this day, humanity is armed with a means of fighting the fatal disease of hydrophobia and of preventing its onset. It is to M. Pasteur that we owe this, and we could not feel too much admiration or too much gratitude for the efforts on his part which have led to such a magnificent result."

Directly Pasteur's great discovery was made known, people who had been bitten by rabid dogs hastened to Paris from all parts of Europe, and a regular hydrophobic service was rapidly organised. Physicians came from all parts of the world, asking to be allowed to study the details of the method. Pasteur took a personal interest in each of his patients, and children especially inspired him with a loving solicitude.

Commission appointed

The Académie des Sciences appointed a Commission, which unanimously adopted the suggestion that an establishment for the preventive treatment of hydrophobia should be instituted in Paris, which resulted in the erection of the Pasteur Institute, in the Rue Dutot, which was opened by President Carnot in November, 1888. This great dispensary for the treatment of hydrophobia has since become a centre of research and teaching on virulent and contagious diseases.

The example was followed in several other countries, and by May, 1889, there had been established seven anti-rabic institutions in Russia, five in Italy, one in Constantinople, one in Barcelona, one in Bucharest, one in Rio de Janeiro, one in Havana, one in Buenos Aires, one in Mexico, and one in Vienna.

Pasteur's discovery was investigated and confirmed by a Commission appointed by the British Government in 1886 to study and verify the facts. After fourteen months' investigation of the prophylactic method, they reported of the new method of inoculation or vaccination discovered by Pasteur, that it would be difficult to over-estimate its utility both from the point of view of its practical side and of its application to general pathology.

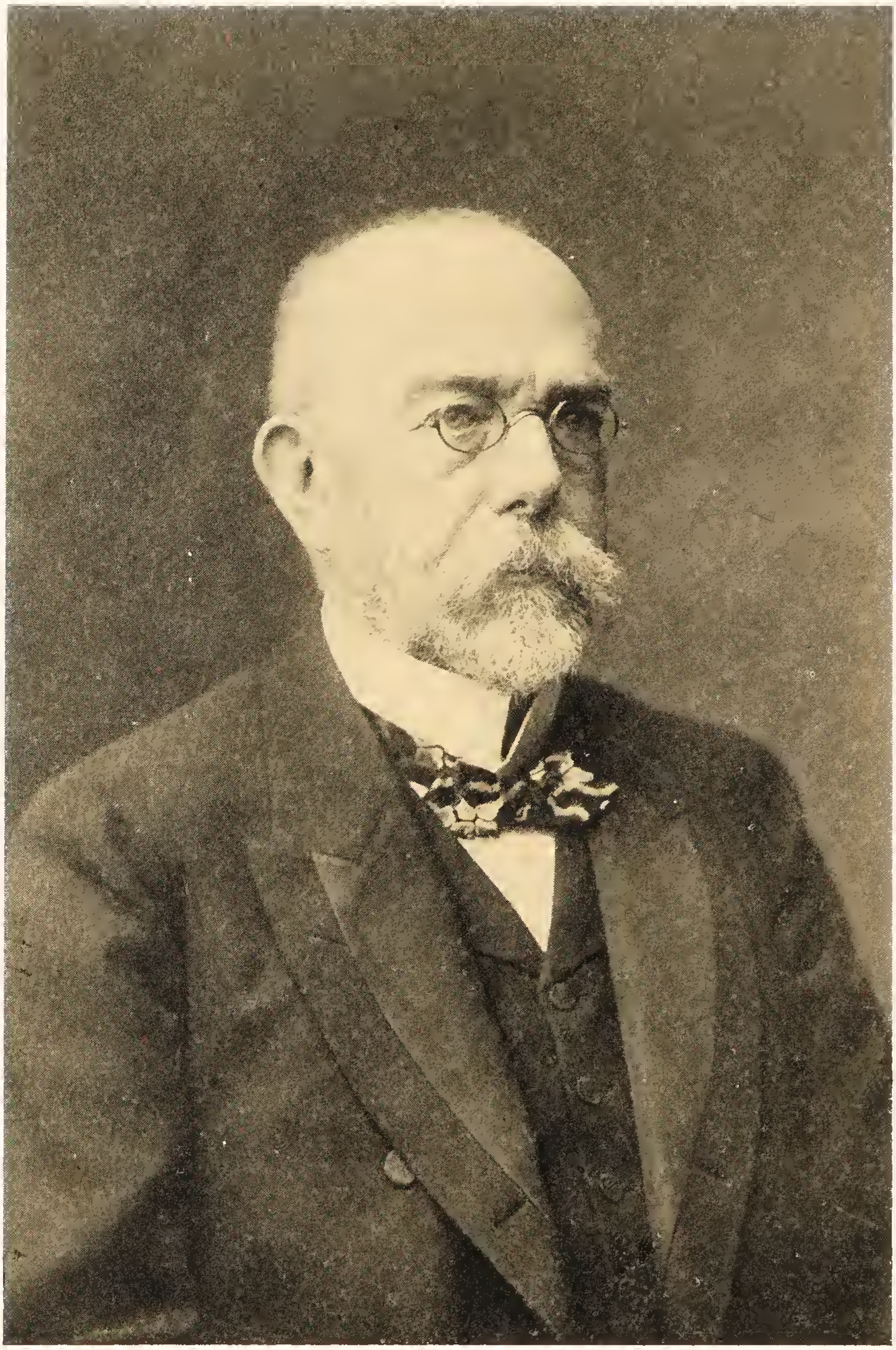
Some statistics of anti-rabic inoculation

Some idea of the value of the treatment may be gathered from the following: Since anti-rabic inoculation was first performed (July 6, 1885) up to May 21, 1889, 6,870 persons were treated at the Institut de Paris alone. Dr. Roux stated, in a lecture delivered before the Royal Society of London on May 23, 1889, that, on an average, since 1885, about a hundred and fifty persons came each month to the laboratory to be inoculated. The injections were made, he stated, in the side, the right and left alternately; they were repeated for fifteen days. For ordinary bites, the injections commenced with medulla dried for fourteen days, and stopped with that dried for three days. In cases which were more serious, a greater number of injections were made, and the recent medullas were arrived at sooner, as a more active treatment was necessary against such bites.

But, with the conclusion of his great discovery in connection with rabies, Pasteur's labours were not

yet ended, and, in spite of his failing strength, in conjunction with Roux and Yersin, researches had already been commenced in his laboratory on diphtheria, which were to lead to brilliant results in the future.

Towards the close of 1895, Pasteur was seized with a serious illness, which caused the greatest anxiety to his family and friends. Although an improvement took place for a short time, he never thoroughly recovered, and on September 28, 1895, he passed away at Villeneuve l'Etang, near the scene of his triumphant discoveries.



ROBERT KOCH
Born 1843 Died 1910

## CHAPTER VII

## BACTERIOLOGY, AND ITS INFLUENCE ON PREVENTIVE MEDICINE

Few men have done more in laying the foundation of the problems associated with immunity and the prevention of disease than Robert Koch, who was the first also to demonstrate the transmission of infectious diseases artificially from animal to animal, from which method such great results have been achieved in recent years.

He was born on December 11, 1843, at Klausthal, in the province of Hanover, and, after finishing his academic career, and taking his degree in medicine, he became an assistant in the General Hospital in Hamburg. Afterwards he became physician to the Asylum for Idiots in Langenhagen, near Hanover, until 1868. He then took up private practice for a time, and after going through the Franco-Prussian War as a surgeon, became district physician in the town of Wollstein. Here he fitted up a laboratory, and commenced to devote all his spare time to the study of the diseases of animals in the district in which he lived. Anthrax was one of the earliest diseases in which he interested himself, and it was his ambition to completely work out the life-cycle of the anthrax bacillus. The results of his research were published in 1876, when he set out the etiological relationship of the bacillus of anthrax to the disease, and by this paper, which has become one of the great classics of bacteriology, he threw the first clear light on the obscurity which at that time enveloped the world of micro-organisms.

Robert Koch

Koch's work on anthrax was accepted everywhere in Germany, but was opposed in France by Paul Bert. Bert's opposition induced Pasteur to take up the study of anthrax. He confirmed Koch's observations, and eventually, as already stated, brought the matter to a practical and satisfactory conclusion.

Koch then, with characteristic doggedness and energy, set himself to work to improve the methods and technique of bacteriology, and to him we owe many of the most useful discoveries in that branch of science. He devised most of the best methods for sterilisation and disinfection, and suggested many improvements in methods of work. Perhaps his greatest achievement may be said to be his poured-plate method for the isolation of organisms in pure culture. Up to this time no method had ever been devised for obtaining pure cultures of organisms from mixtures. He watched with minute care the development of the bacteria under the microscope, rejecting as worthless any preparations which showed extraneous organisms, and controlling his work by constantly producing the disease by inoculation. To obtain his pure cultures he employed nutrient gelatin, which he used in such proportions as to give a solid coagulum when cool, and added to this gelatin meat infusion to furnish a nutrient medium for the growth of organisms. His method of making streak cultures and of pouring plates gave pure cultures, and solved a problem which had been attempted by so many of his predecessors, and which gave greater impetus to the advancement of bacteriology as a science.

Koch's bacteriological work

He demonstrated the parasitic nature of infectious diseases, and the methods of cultivating pathogenic bacteria outside the body were brought by him to a high degree of perfection. In this way a systematic study of the cause of a disease became possible, and the means of combating its action determined by experiments.

Koch eventually removed to Berlin, and devoted himself exclusively to laboratory work. In 1882, he set to work to elucidate the etiology of tuberculosis, which he succeeded in proving to be due to the tubercle bacillus. To demonstrate this he devised a new method of staining, by means of which he could

Etiology of tuberculosis

differentiate between the organisms always present in tuberculous regions and those accidentally found there. He finally succeeded in cultivating the organisms he had stained, on solidified blood serum, and proved their relation to the disease by inoculation experiments on rabbits and guinea-pigs.

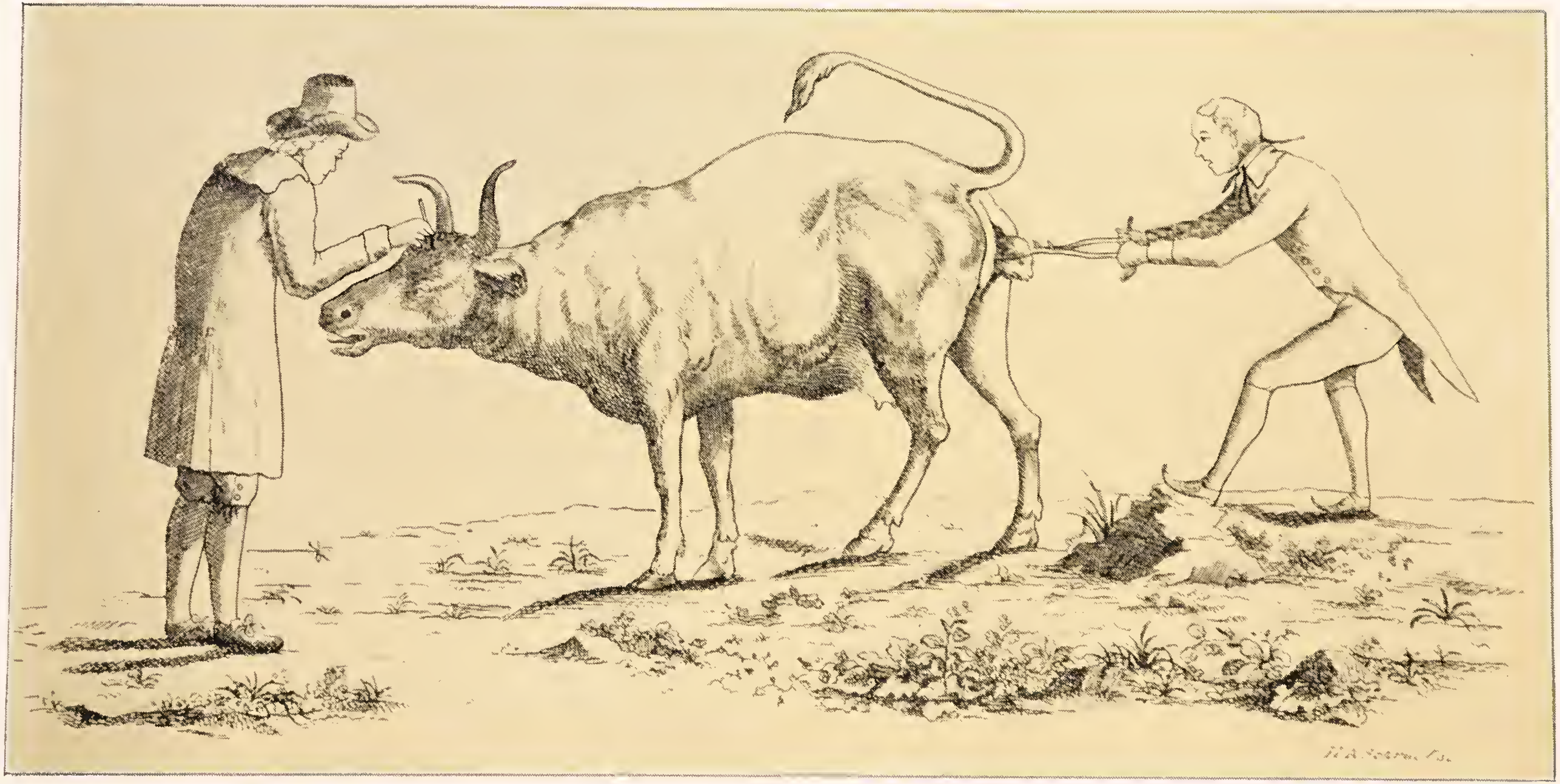
Preparation of tuberculin

In 1890, he described the preparation of tuberculin, which was at once hailed throughout the world as the great specific for tuberculosis. Unfortunately, on trial it did not prove the success anticipated, and its failure for some time detracted from Koch's reputation. Physicians and patients suffering from the disease flocked from far and near to Berlin in the hurry to obtain even the smallest quantity of the remedy, and the use of this potent product, given indiscriminately in too large doses by inexperienced men, was followed by disastrous results.

Improved methods of preparation have since been devised and exact knowledge has been gained, so that tuberculin has again come into extensive use both therapeutically in cases of tuberculosis and as a means of diagnosis in testing human beings or animals for the existence of the disease.

The later years of Koch's life were devoted to the investigation of tropical diseases, and the study of malaria. For this purpose he travelled through South Africa and German East Africa, and was in charge of the sleeping sickness commission sent out by Germany in 1906.

He died on May 27, 1910, working in the institute where he laboured daily, almost up to the last.



"THE COWPOX SWINDLE" (DER KUHPOCKEN SCHWINDEL)

From a German caricature of 1801

## CHAPTER VIII

## The Modern Development of Inoculation and Serum Treatment

Methods of immunisation compared

Only the briefest summary is possible of the enormous development of prophylaxis and treatment by specific inoculation, since the new era of exact bacteriology was inaugurated by the researches of Pasteur, Koch, and their immediate followers. It may be stated that, apart from theoretical investigation of the mechanism of the immune reaction, practical progress has been made along two distinct lines. Pasteur's method of inoculation with an attenuated culture or virus, as described in a previous chapter, was directed to the active immunisation of the patient, and this is the basis of the various forms of protective or therapeutic inoculation or "vaccination" in use at the present day, whether the inoculum or vaccine consists of a living culture of modified virulence, a suspension of the killed organisms, or a solution of the soluble toxic substances which the organisms produce in artficial fluid media. As an example of the use of a culture of modified virulence may be mentioned Ferran's and Haffkine's prophylactic vaccines against cholera and Strong's similar vaccine for plague. Killed cultures are used prophylactically in Kolle's cholera and Haffkine's plague vaccine. Wright was responsible for the first systematic use of a killed suspension of typhoid bacilli as a protective inoculation against enteric fever, and, largely owing to the advocacy of the same observer, analogous killed cultures have acquired an important position in the prophylaxis and treatment of almost all infections which can be definitely associated with a known type of organism. Active inoculation of the patient with soluble toxic substances produced in artificial culture is an important factor in the therapeutic use of the tuberculins.

W. M. HAFFKINE

Blood and serum

Investigation of the nature of the changes in the tissues of the animal, which accompany the process of immunisation by the injection of bacteria or their products, and which form the basis of the new condition of acquired resistance, led to the discovery that the blood and serum of such immunised animals contain substances capable of neutralising the inoculated poison or destroying the inoculated organism. The discovery of the formation of substances antidotal to bacterial toxins is associated with the names of Salmon and Theobald Smith, Brieger and Kitasato, Roux and Yersin, Chantemesse and Charrin and others. Pfeiffer showed clearly that many organisms, such as the bacilli of cholera and typhoid, streptococci, etc., to which the animal body can acquire a high degree of immunity, form no significant amount of soluble toxins. Metschnikoff and his followers attributed the defence of the organism against such invaders to the phagocytic activity of the leucocytes; but here again the work of many observers, starting with Flügge and Nuttall, showed that the body fluids of the immune animal contain substances which destroy the vitality and even the structural integrity of the infecting organisms.

"Opsonins"

It may be noted that the apparent gap between the phagocytic and humoral theories of immunity against bacteria, has been bridged to some extent of recent years by the description of "opsonins" (Wright), bodies which so alter the bacteria that they are defenceless against the attack of the leucocytes. Another great step was made when it was shown that the protective anti-bodies, whether antitoxic or anti-bacterial in action, could be transferred to an animal not actively immunised. This was shown by Richet and Hericourt to be possible with serum from an animal immunised against pyogenic cocci. A few years later came the classical work of Behring and Kitasato, proving the possibility of transferring immunity against the toxins of tetanus and diphtheria, by injecting into a normal

PROF. BEHRING

animal, serum from an animal rendered immune by a course of inoculation with such toxin. The introduction of these two antitoxic sera, obtained from highly immunised horses, into practical human therapeutics, in which Roux also played an important part, formed the beginning of serum therapy as distinguished from inoculation; and they still hold their place as the most unquestionably efficacious among the various sera now available for use, though Flexner's recent results with an anti-meningococcus serum, in epidemic cerebrospinal meningitis (spotted fever), bid fair to challenge this supremacy.

Beginning of serum therapy

It will be seen that the rival methods of inoculating and immunising the patient himself on the one hand, and transferring serum from an animal immunised by inoculation on the other, aim at inducing two distinct types of immunity, called "active" and "passive" respectively by Ehrlich. These researches, starting with and brilliantly solving the problem of the exact evaluation of sera for practical use, led him to enunciate those conceptions of the mechanism of the immune reaction which have furnished the stimulus for and fixed the direction of an enormous proportion of recent work on the subject.

"Active" and "passive" immunity

From this brief summary of the results, which man, with such patience and ingenuity, has achieved in recent years over these insidious enemies of his well-being, some idea of the value of inoculative treatment may be estimated. Serum treatment is but as yet in its infancy, and its possibilities in the future are great. The success that has followed its employment in modern times promises that it may eventually prove one of the most helpful branches of the healing art, especially in combating some of the most terrible diseases with which mankind is afflicted.

"The Admirable Effects of Vaccination"

THE HERB GARDEN
'WELLCOME' MATERIA MEDICA FARM

THE HERB GARDEN
'WELLCOME' MATERIA MEDICA FARM
Another view

The Herb Garden is an annexe to the 'Wellcome' Materia Medica Farm at Dartford, near London, England. In it are grown specimens of medicinal plants and herbs. Each specimen is carefully indexed for reference.

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*Reproduced from photographs developed with 'Tabloid' Photographic Chemicals.*

A FIELD OF DATURA METEL

Recent investigation has shown that *Datura metel* contains Hyoscine, Hyoscyamine and Atropine, in proportions differing from those occurring in other solanaceous plants.

DATURA STRAMONIUM

The vigorous growth of *Datura stramonium* cultivated on the 'Wellcome' Materia Medica Farm, is evidenced by comparison with the erect figure in the photograph.

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*Reproduced from photographs taken on the 'Wellcome' Materia Medica Farm, and developed with 'Tabloid' Photographic Chemicals.*

# THE 'WELLCOME' MATERIA MEDICA FARM

## A MODERN PHYSIC GARDEN

In the footsteps of Gerarde

IN one of the numerous prefaces to his *Book of Plants*, John Gerarde, author of the first English Herbal, speaks of erecting "the laboratory of an industrious Chimist by the sweet garden of flourishing simples" in Holborn.* Where the "sweet garden of flourishing simples" once was, the Chief Offices of Burroughs Wellcome & Co. now stand; and, hard by, the Wellcome Chemical Research Laboratories occupy a site in King Street. The day of gardens in Holborn is, however, long since past, and the 'Wellcome' Materia Medica Farm lies beyond the outer limits of the city's growth at Dartford, in Kent.

The philosophy of physicke gardens

Of his "sweet garden of simples" the old herbalist discourses like a lover, the while he reviews with philosophic insight, the advantages of the laboratory associated with it. "The Physicke reader," he avers, "by their meanes shall not only come furnished with authorities of the Antients and sensible probabilities for that he teacheth, but with real demonstrations also in many things which the reason of man, without the light of the fornace, would never had reached unto."

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* London, England

**Of Gerarde and his "Herbal"**

Gerarde's *Herbal* is notable as containing the first picture and description of the true potato plant, introduced into England in the year 1597. Born "at Namptwich in Cheshire, from whence he came to this city and betooke himself to Surgery . . . and therein attained to be a Master of that worthy profession," Gerarde died in 1607. The groundwork of his *Book of Plants* is stated to have been a translation of "Dodonaeus his Pemptades comming forth anno 1583."

**View-points**

To be true to purpose, the physic garden must, in essence and in fact, make a laboratory of the open fields, and of this idea Gerarde had some conception. Having as its object the study, not so much of the dead and dried herb as of the living plant and the conditions which influence its growth and the development of its properties, constant experiment must needs be the medium of investigation. The mediæval view-point of disease as due to malign influences to be driven forth from the body by nauseous draughts, had led Luther to exclaim upon the "wonderful virtues" of "mere muck." To this crude conception succeeded the fanciful assumption that every plant bore some outward indication, in form or colour, of the disease it was supposed to cure—resulting, actually, in the practice of a confused polypharmacy. The acumen of the elder pharmacists consequently exhausted itself in minute pharmacognostic distinctions, and the evolution of interminable vegetable pharmacopœia. The plants, as grown, were accepted without question, innocent of assay, for the preparation of galenicals.

The isolation of alkaloids in the early part of last century exposed like a searchlight the futility of

this, and revealed another and a deeper problem. The discrepancies in alkaloidal value and strength of active principles between different samples of the same plant, to all outward seeming alike, became evident; and, to these, pharmacognosy afforded no clue. A paper by Carr and Reynolds* illustrates at once the importance of assay and the need of devising measures to secure uniformity of content.

Serious discrepancies

It was found that one specimen of Squill was approximately three times as strong as another, while the amount of petroleum-ether-soluble alkaloid in Coca leaves varied from 0·018 per cent. to 0·79 per cent. Aconite, Belladonna herb, Calabar bean, Digitalis, Ergot, Hyoscyamus, Jaborandi and Strophanthus all showed wide variation, and in the case of Cinchona there was a difference between the highest and the lowest grades, bought on the actual market, of 3·87 per cent. of quinine and cinchonidine. In so far as variability of action must, of necessity, result from variability of content, these figures are significant of much.

Pioneers in standardisation, as in other departments of pharmacy, Burroughs Wellcome & Co. found their efforts hampered from the outset by these discrepancies. Control must obviously begin at the sources of production. The introduction of 'Wellcome' Brand Standardised Galenicals, therefore, led them to establish a scientific Materia Medica Farm near the 'Wellcome' Chemical Works at Dartford, with the twofold object of supply and experimental research — again a conjunction reminiscent of Gerarde.

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* Carr and Reynolds, *Pharm. Journ.* (Eng.), 1908, **80**, 542

**A modern herb garden**

By careful selection and propagation of the best stocks, by attention to the composition of the soil, by adaptation of stocks to soil and site, by collection of the plants at their period of richest yield, and so forth, it was sought to eliminate factors of variability and to obtain the most uniform results from the choicest strains.

**Experimental results**

The major portion of this 'Wellcome' Materia Medica Farm is devoted to the cultivation of staples, but an experimental section is maintained in constant activity. Belladonna, for instance, has been shaded during growth by various coloured fabrics, and treated with different fertilisers. In the course of these researches it was ascertained that the yield of alkaloid is affected more by climatic conditions than by other alterations in environment, and that the superiority of English leaves is due to the English climate. Experiments with Broom tops, again, proved that the amount of sparteine contained in them varies according to the time of year, being low during the flowering and growing period, and increasing during autumn and winter, when reproductive activity has ceased. The Digitalis required for the production of 'Wellcome' Brand Concentrated Tincture of Digitalis and 'Wellcome' Brand Extract of Digitalis is also grown at the 'Wellcome' Materia Medica Farm. The result is that variations in character of the leaves have been reduced to those necessarily due to the variations of season from year to year. Added to which, errors due to the inclusion of faulty or untrue specimens are avoided.

**Advantages**

Further advantages derived from this conjunction of experiment and research with the actual growing

of the plants and the preparation of their galenicals are :—

(1) A drug may be expressed or worked up immediately it has been collected.

(2) Herbs may be dried directly they are cut, before fermentation and other deteriorating enzymic changes have set in.

(3) Caprice on the part of collectors—who, in gathering wild herbs, are very difficult to control in the matter of adulteration, both accidental and intentional—is prevented.

(4) It is possible to select and cultivate that particular strain of a plant which has been found by chemical and physiological tests to give the most satisfactory preparations. Notable instances are to be found in connection with Digitalis and Belladonna.

An article in the *Chemist and Druggist*, London (Eng.), of January 29, 1910, gives us an idea of this latest of "physicke gardens," situated

> "on an undulating slope, with here and there a clump of trees and a strip of wild woodland, between the river and the North Downs, hard by the little village of Darenth. No more ideal spot for a herb farm could have been chosen. It has shade, sunshine and moisture, and a fine loamy soil, varied by sandier uplands.
>
> "A visit to the farm shows that the greater part is devoted to the cultivation of staples ; but a number of plots are used for experimental crops. Among such are meadow saffron *(Colchicum autumnale)*, with its pale-purple flower. Lavender, peppermint, and French roses grow side by side. Senega and the unpretentious taraxacum, with its bright yellow petals, occupy other spaces. Ginseng, the root that plays so important a part in Chinese medicine, is also grown. *Podophyllum peltatum*, *Scopolia atropoides*, *Datura meteloides*, sea poppy *(Glaucum luteum)*, and *Grindelia robusta*, are other plants that one does not usually find growing on a scale greater than the experimental ; but the plots of *Hydrastis canadensis* are botanically and commercially the most interesting on the farm, in view of the fact that we are coming within measurable distance of the end of the natural supply from North America.

# 'TABLOID' MEDICAL EQUIPMENTS
# AT THE NORTH POLE

APRIL 6, 1909

'TABLOID' MEDICINE CHEST

supplied to

REAR-ADMIRAL ROBERT EDWIN PEARY

Inset are photographs of Rear-Admiral Peary and one of eight tubes of 'Tabloid' products, the **only** medicines actually carried by him to the North Pole

# MEDICAL EQUIPMENTS FROM POLE TO POLE

FIT refuge from the wintry Northern ocean, it was natural that the deep fjords of Norway should harbour a race as fierce as the storms that beat upon their stern headlands. With no compass to guide them, with only the sun and the stars to steer by, and naught but their intuitive sea-lore to preserve them, "unconscious that they were specially brave," these sea-worn adventurers battled with ice and storms and infinite hardships, and became, in Nansen's proud phrase, "the first explorers of the Northern Seas" and the earliest of ocean navigators. "They discovered the wide Arctic Ocean and its lands; they settled in the Scotch islands, found and colonised the Faroës, Iceland and Greenland—were the discoverers of the Atlantic Ocean and of North America," he tells us.

The earliest Arctic explorers

In the ninth century, there is mention of their Northern explorations in the Anglo-Saxon history of Alfred the Great.

In the tenth century, Norsemen from Thule,* under Eric the Red, reached and settled Greenland; and it is practically certain that Norsemen discovered North America about 500 years before Cabot and Columbus. "South of Greenland is Helluland, next to it is Markland, and then it is not far to Wineland the Good . . . . " the old Icelandic geography read. Helluland (*i.e.* Slate or Stone-Land) is identified with Labrador; Markland (*i.e.* Woodland) with Newfoundland; while, beyond the legendary Wineland —the Hy-Breasail of the Irish, and the Fortunate Isles of Isidorus — "no habitable land is found in this ocean, but all that is more distant is full

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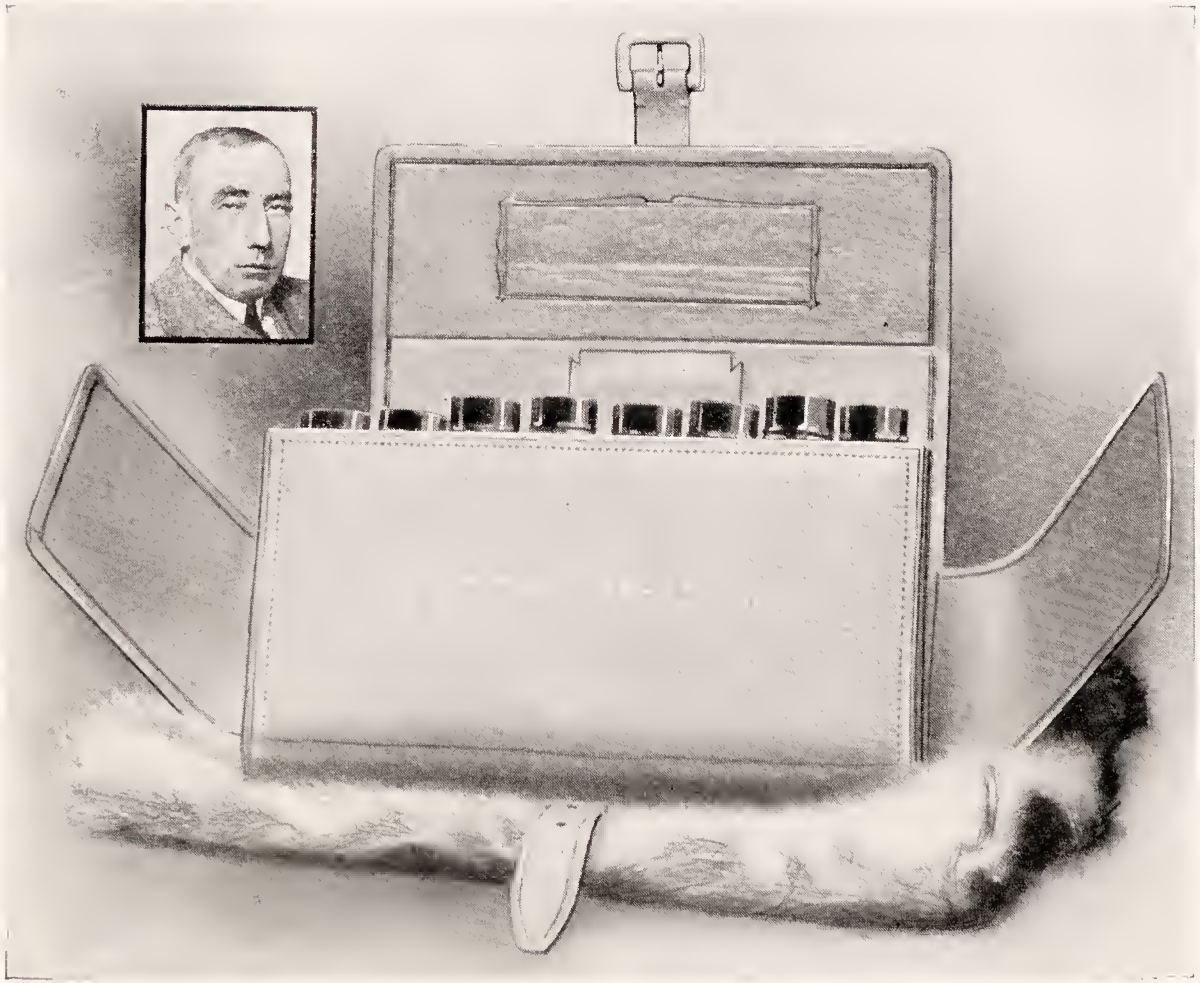
* Iceland



# 'TABLOID' MEDICAL EQUIPMENTS

## AT THE SOUTH POLE

DECEMBER 14-17, 1911

'TABLOID' MEDICINE CHEST

supplied to

CAPTAIN ROALD AMUNDSEN

for his successful journey to the

SOUTH POLE

'Tabloid' products were the **only** medicines actually carried by Captain Amundsen to the South Pole.

Inset is a photograph of Captain Amundsen

of intolerable ice and immense darkness. . . . . " Thus Svein Estridssen, King of Denmark and nephew of King Canute.

The North-West Passage and Polar exploration

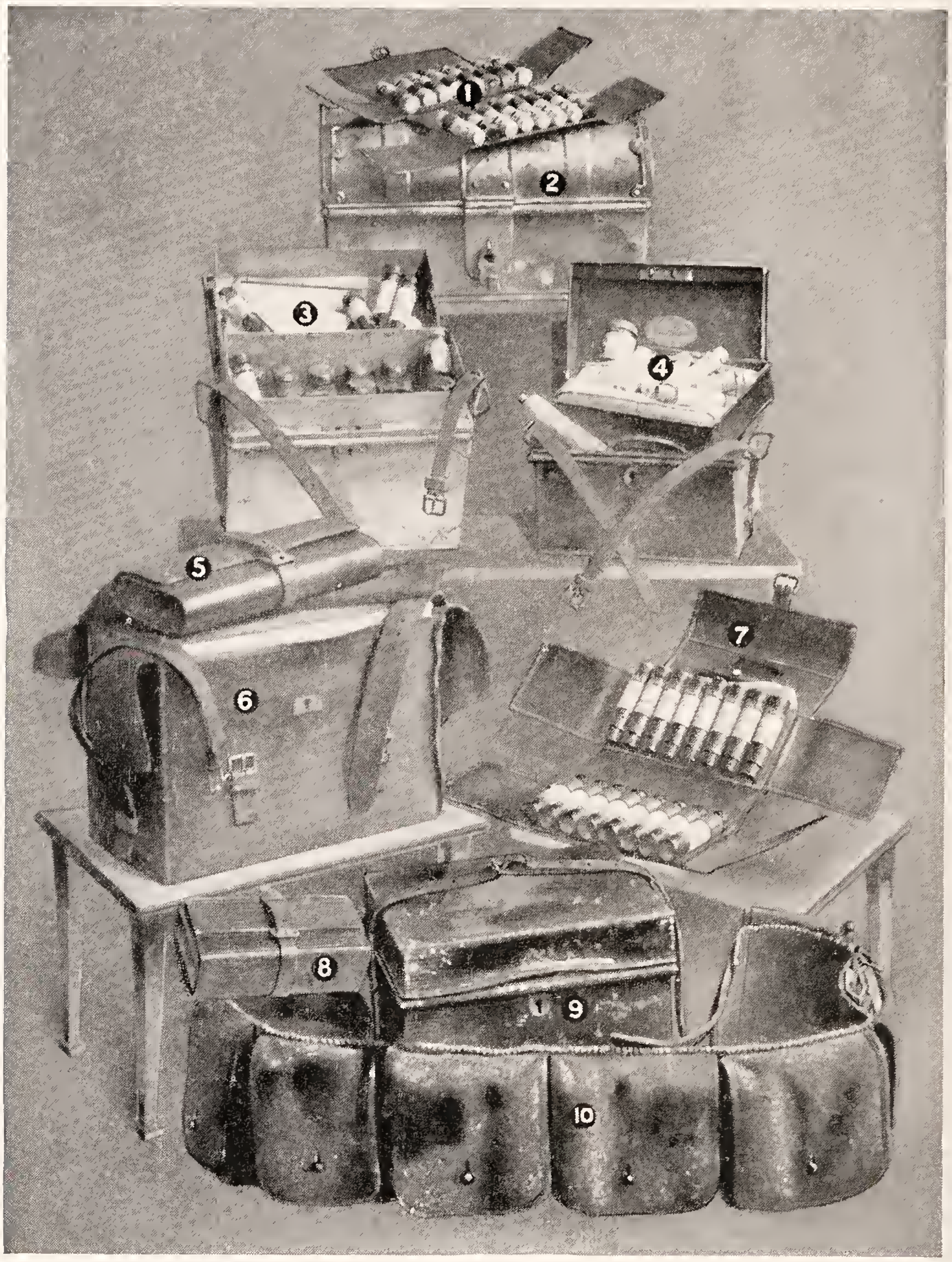
The "dark and curdled sea" which formed the outer boundary of the viking world, legendary though it be, had yet its natural prototype in the frozen ocean of the Arctic world, familiar to the early Norse adventurers; and the longed-for passage to the Wineland of the sagas has its historic parallel in the attempts to find a North-West Passage to the Southern "Indies," from which directly sprang attempts upon the Pole itself.

Franklin

Beginning with Cabot, Frobisher and Davis, the illustrious line continues through Hudson and Baffin; through Cook in a later day; through Scoresby (who touched 81° 30′ N.) and the Rosses to Parry, who, in 1827, made a determined effort to reach the North Pole from Spitzbergen, but was thwarted by the drift of the ice in 82° 45′ N. The tragedy of Franklin (1847), and the magic of that heroic narrative of "white men marching southwards" like ghosts in the frozen silence—"and as they walked along they fell down and died"—fill with splendour the middle period of the nineteenth century. During the search for Franklin, McClure actually made the North-West Passage in 1852. In 1871, Hall, in the *Polaris*, reached 82° 16′. In 1878, Markham, in search of open Polar sea, attained Lat. 83° 20′ N., by sleigh from Sir George Nares' expedition; and succeeding expeditions by Greeley and others added largely to the knowledge upon which was based the master-effort of Peary in 1909.

Preventable losses

The hardships of the early explorers and the wastage from disease fill a mournful page in human history. Not until Parry's day (the *Hecla*, 1819), do we find mention of successful medical precautions being taken on any expedition. 'Tabloid' Medical Equipments made it possible for the explorer to carry—on his own person



Relic 'Tabloid' Medicine Cases—Polar Exploration

1—Scottish National Antarctic medicine case. 2—Chest used during three years' exploration by the Jackson-Harmsworth Arctic Expedition. 3—A duplicate of the chest carried by the Duke of the Abruzzi's Polar Expedition. 4—Part of the complete medical equipment supplied by Burroughs Wellcome & Co. for the National Antarctic Expedition, 1901. 5—Andrée, on his historical attempt to reach the North Pole by balloon, carried a case of this design. 6—Medicine case used by Wellman on his attempt to reach the North Pole in an airship. 7—Carried on the journey to the summit of Mount Erebus, and during the "Farthest South" journey, British Antarctic Expedition, 1907-9. 8—Case carried by the party which reached the South Magnetic Pole, British Antarctic Expedition, 1907-9. 9—Duplicate of the chest which formed part of Peary's equipment on his historic discovery of the North Pole. 10—Belt supplied to Nansen for his journey "Farthest North."

if need be—a sufficient supply of chosen remedies of real practical value. Nansen, for his famous voyage in the *Fram*, was supplied with 'Tabloid' Medical Equipments. First of the new vikings of modern Polar exploration, as daring as he was original, Nansen deliberately jammed his ship in the ice (September, 1893), in the hope of drifting across or near the Pole. In March, 1895, the *Fram* touched 84° N., and Nansen, with a companion, left her, and with the aid of dogs and kayaks reached 86° 14′—his "Farthest North." The belts and other 'Tabloid' Equipments supplied to Nansen now form part of Burroughs Wellcome & Co.'s historic collection of outfits. Of this equipment the explorer reported in enthusiastic terms.

Modern Medical Equipments

Nansen's "Farthest North"

Nansen was eventually picked up by the Jackson-Harmsworth Expedition, of whose 'Tabloid' Medical Equipment the surgeon in charge reported:—

"I find the 'Tabloid' drugs are most convenient, especially in circumstances such as we are placed in."

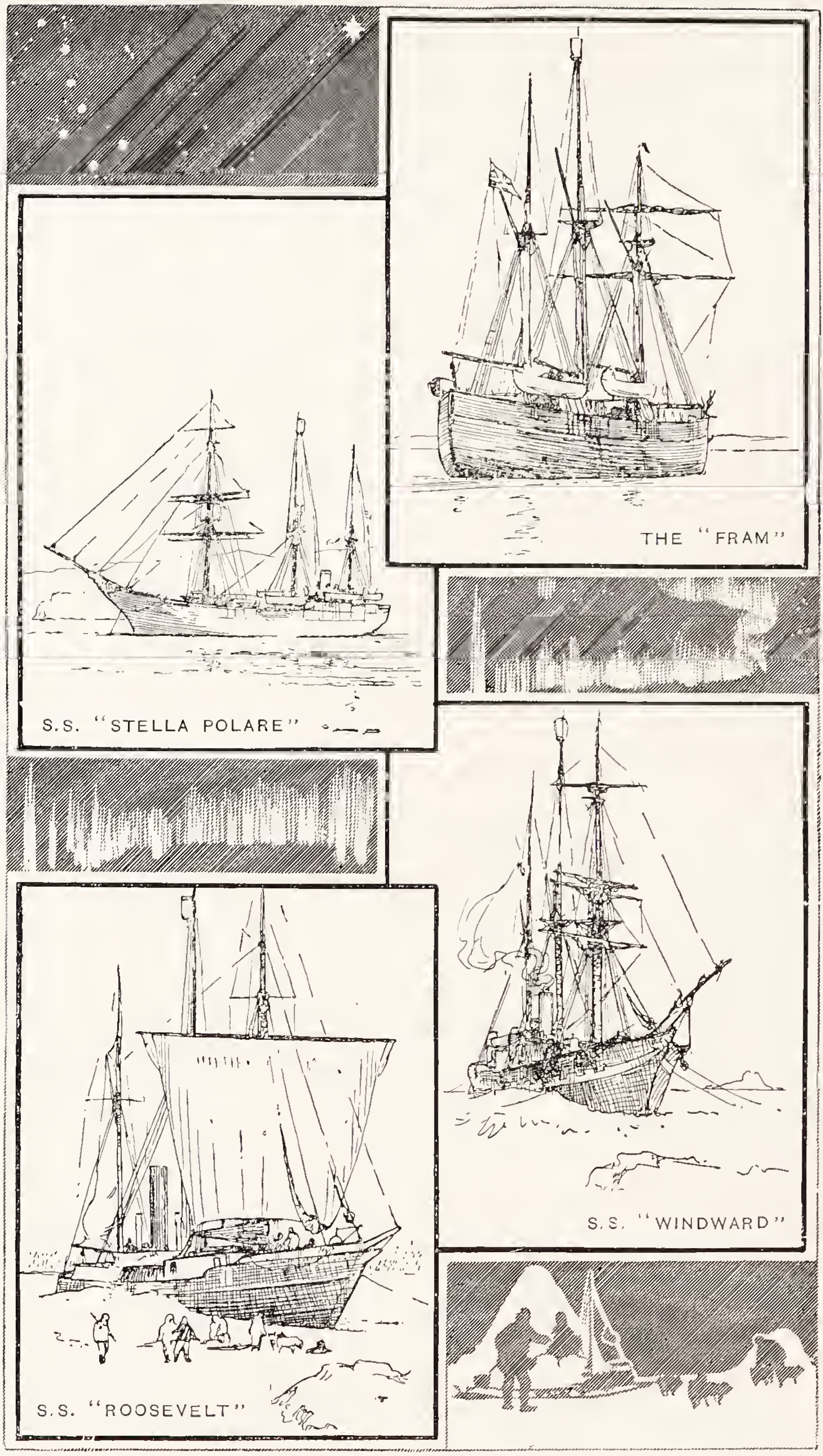
Jackson-Harmsworth Expedition

In 1907 Andrée, greatly daring, endeavoured to reach the North Pole by balloon, his sole medical outfit being a 'Tabloid' Medical Equipment. Starting from Spitzbergen on July 11, he vanished utterly; only his name and fame remain. A solitary carrier-pigeon bore the only message ever received from him.

Andrée

Nansen's "Farthest North" was ultimately surpassed by Captain Cagni of the Italian Arctic Expedition commanded by the Duke of the Abruzzi, 1899–1900. Despite the fact that latitude 86° 33′ 49″ N. was reached, the 'Tabloid' Medicine Chests and Cases with which the Expedition was equipped, were brought back with their contents quite unaffected by the rigour of the climate.

The Duke of the Abruzzi



Ships of the Nansen, Duke of the Abruzzi, Jackson-Harmsworth, and Peary Arctic Expeditions, all equipped with 'Tabloid' Medical Equipments

Peary

In 1906 Peary penetrated beyond the 87th parallel, as far as 87° 06′ N., and in 1909 completed the task "for which," he says, "I had worked during twenty-three years; for which I had lived the simple life; . . . for which I had trained myself as for a race." Pioneered by the faithful Bartlett as far as the 88th parallel, Peary then pressed on alone with the pick of his dogs and his best Eskimos, and, on April 6, planted the Stars and Stripes at the North Pole, as determined by astronomical observations.

'Tabloid' Equipments at the North Pole

One of the eight tubes of 'Tabloid' products carried by Peary to the North Pole was presented by the distinguished explorer to Burroughs Wellcome & Co. on his return. In a report, forwarded from Etah, Greenland, Peary wrote: "Burroughs Wellcome & Co.'s 'Tabloid' Medicine Cases and supplies have proven invaluable." And in a previous report he conveyed his "appreciation of the wonderful compactness and utility of your products."

First at the North Pole. First at the South Pole

First at the North Pole with Peary, the successful discovery of the South Pole by Amundsen adds yet another record to the credit of 'Tabloid' Medical Equipments, Amundsen having been supplied by Burroughs Wellcome & Co. with a 'Tabloid' Outfit for his perilous Antarctic venture. "It was splendid in every way," he reported.

Foresight

The narrative of Amundsen reveals a quiet, surprising courage, and an uncanny foresight and somewhat humorous outlook, in grappling with difficulties. He built 150 cairns on his way to the South Pole to serve as beacons and depôts for the return journey; he accumulated a store of 60,000 kilos of seal-meat at "Framheim"; he travelled far and fast on ski; and he found a new and comparatively easy route to hand. Dog-meat was voted "delicious."

An astounding success

Amundsen had acquired Nansen's old ship, the *Fram*, and his original intention was to fix her in the ice off the northern coast of Alaska and drift as near the North Pole as possible. Outward bound, news of Peary changed all his plans, and quietly, without harking back, he decided to be first at the South Pole. In all the history of exploration nothing was ever more astounding in its complete success. Favoured by conditions, the Pole was attained, after a rapid journey from the base, at an elevation of 10,260 feet, on December 14–17, 1911. The travellers suffered somewhat from the effects of altitude, the Antarctic continent being mountainous. Of his 'Tabloid' Outfit Amundsen reports :—

> "I have much pleasure in testifying to the efficiency of the 'Tabloid' Brand medical equipment with which you supplied me in 1910. All the medicines were most beautifully packed, and everything kept well.
>
> "The brown leather case which I returned to you was the only one which I actually carried with me to the South Pole, and I have much pleasure in sending it back to you as a souvenir of my journey.
>
> "I shall always consider one of your equipments as indispensable for either Arctic or Antarctic travels."

Roald Amundsen

In his book *The South Pole*, Captain Amundsen notes that this equipment was unaffected by cold and damp, and was the only medical equipment supplied to the expedition which did not deteriorate in any way.

"Double First"

'Tabloid' Brand Medical Equipments were the **only** medical equipments actually carried to the Poles by the successful explorers. 'Tabloid' Medical Equipments were, therefore, **First at the North Pole** and **First at the South Pole.**

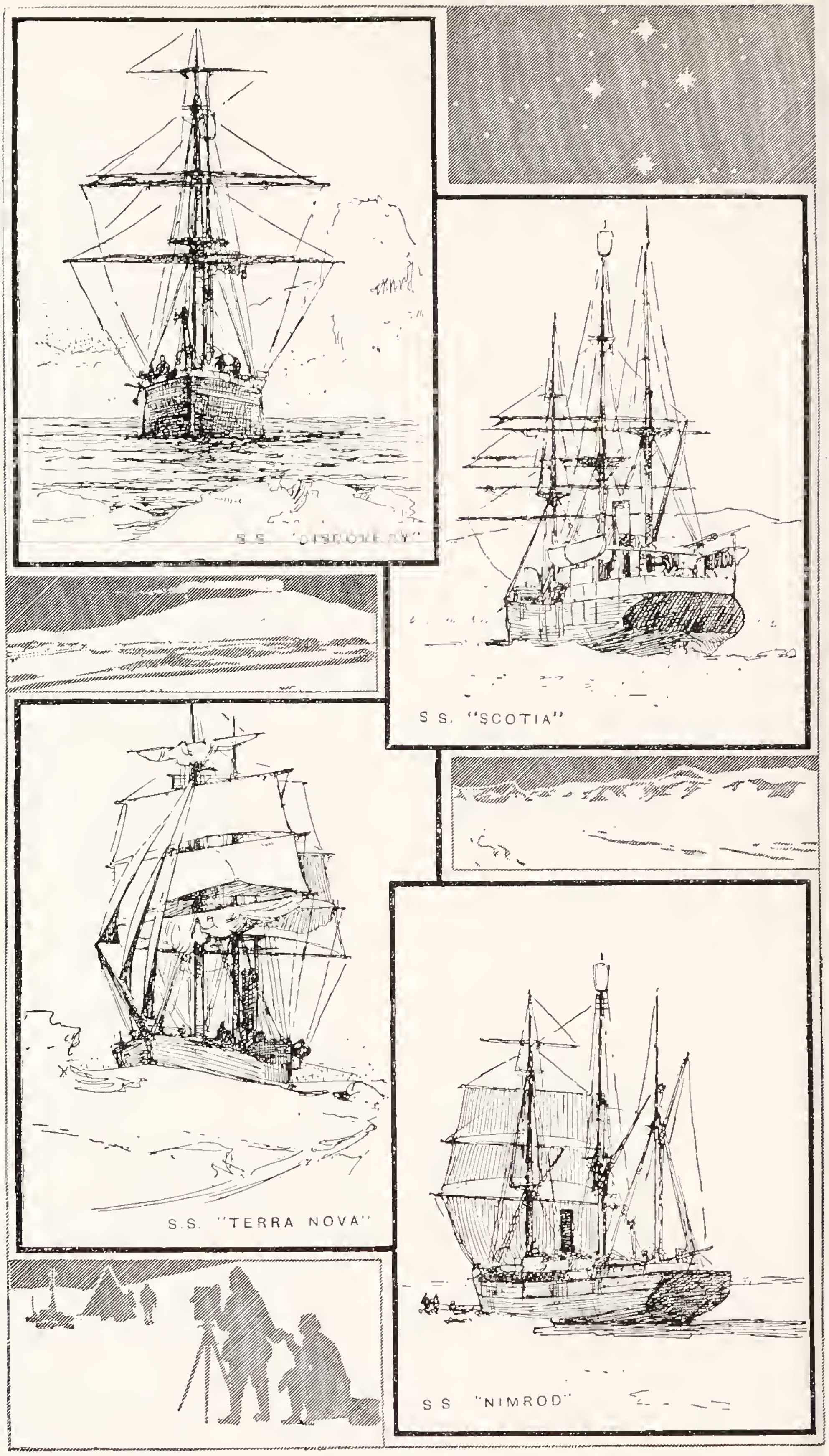
No such record can ever be repeated. Made once and for all time—unique and unapproachable—the record stands, and of this honour, 'TABLOID' MEDICAL EQUIPMENTS can never be deprived.

Previous explorers

The history of Antarctic exploration prior to Amundsen is brief, and in it 'TABLOID' MEDICAL EQUIPMENTS vie, as it were, with their own record in the Arctic. The achievements of Captain Cook, who first crossed the Antarctic Circle in 1771; of Bellingshausen, who in 1821 first sighted Antarctic land; and of Sir James Ross, the discoverer of the Great Ice Barrier, and of Mounts Erebus and Terror on the Antarctic land mass (1841), need not detain us. Not until 1895 did any human being set foot on this virgin "Continent of Snows," when Borchgrevink landed from the *Southern Cross*. In 1901, Scott, in the *Discovery*, passed the eastern-most point attained by Ross sixty years before, crossed the Great Barrier—which he found thirty miles farther south than in Ross's day—and advanced 380 miles by sledge towards the Pole. This arduous journey occupied three months, and the record latitude of 82° 17′ S. was reached. On sledge journeys the question of weight is of great moment. The traveller, on such occasions, must carry but the barest necessaries, and of these the lightest procurable. The medicine chest is an important item. Every drug carried must be of the utmost reliability, in the most compact state, and capable of withstanding an extremely low temperature.

THE SMALLEST MEDICINE CHEST IN THE WORLD

This tiny gold medicine chest is fitted with twelve square medicine chest bottles containing 300 doses of 'Tabloid' Brand Medicaments, equivalent to 15 pints of fluid medicine



Ships of the National Antarctic Expedition, 1901, the Scottish National Antarctic Expedition, the British Antarctic Expeditions, 1907 and 1911, all equipped with 'Tabloid' Medical Equipments

To the enthusiasm of Sir Clements Markham, K.C.B., then President of the Royal Geographical Society, the successful organisation of the Expedition is largely due. Referring to the 'Tabloid' Medical Equipment of the *Discovery*, he reports:—

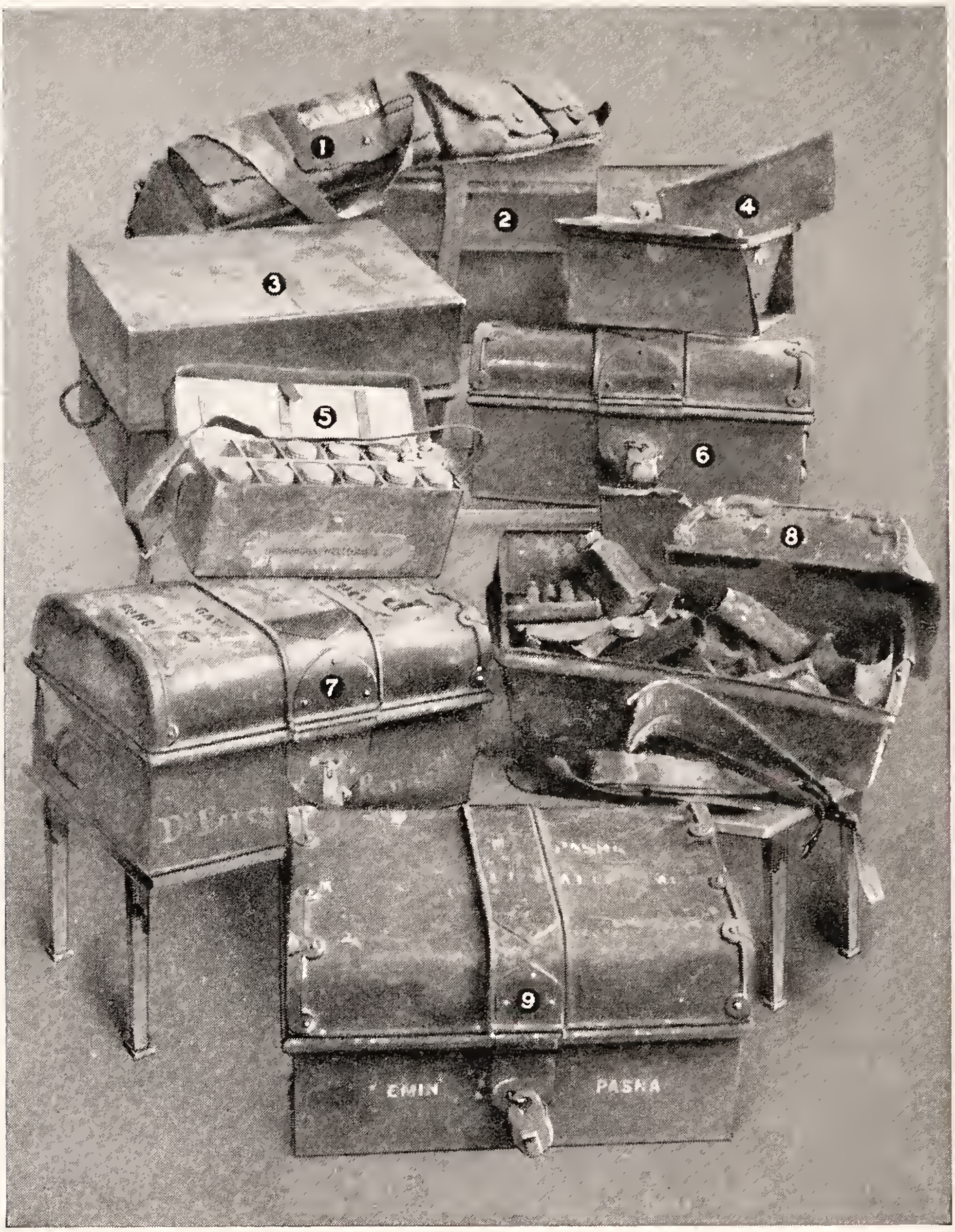
> "The Medical Equipment of the Exploring Ship of the National Antarctic Expedition was entirely supplied by Messrs. Burroughs Wellcome & Co., and proved in every way most satisfactory.
>
> "The few other drugs and preparations which were taken with the Expedition were only supplied for purposes of experiment, and can in no way be regarded as part of the medical equipment."
>
> Clements R Markham

Dr. Edward Wilson who was in charge of some of the sledge journeys from the *Discovery*, reported:—

> "*Discovery* Antarctic Expedition
>
> "Though there was but little serious illness on the *Discovery* during the recent Antarctic Expedition, the 'Tabloid' preparations and the cases were put to a fairly rigorous test, not only in the ship, but on the various sledge journeys that were undertaken, during which they experienced temperatures as low as 68° below zero, and much rough handling, without any loss in efficiency and usefulness. Certain of the 'Tabloid' Ophthalmics were freely used for snow blindness, and were found to be most convenient."
>
> Edward . A. Wilson

It will be remembered that Dr. Wilson accompanied Captain Scott upon his second Antarctic Expedition, in 1910, and perished with his leader during the tragic return journey from the South Pole in 1912.

To the Scottish National Antarctic Expedition, covering a period of nearly two years, and comprising two separate voyages of the *Scotia*, belongs the distinction of having attained the latitude of 74° 1′ S. The entire medical equipment of the Expedition was supplied by Burroughs Wellcome & Co., and



Relic 'Tabloid' Medicine Cases—Africa

1—Medicine belt carried by Capt. Stairs throughout his Katanga Expedition. 2—The famous "Rear-Guard" medicine chest used during Sir H. M. Stanley's travels. 3—Extricated from the ruins after the Bandawe Mission House had been demolished by lightning; the contents that escaped damage were used for more than ten years afterwards. 4—Once the property of E. G. Glave. Supplied for a journey made concerning the great slave question of Central Africa. 5—Carried by Capt. Thomas Stevens on the expedition in East Africa to find Stanley. 6—Chest carried by Sir H. M. Stanley during the Emin Pasha Relief and other Expeditions. 7—Formerly the property of Dr. Percy Rendall, Principal Medical Officer, British Central Africa Administration. 8—Case carried by Frank Muxworthy, the famous African Caravan Leader, on three journeys through Uganda. 9—The last medicine chest supplied to Emin Pasha.

gave the utmost satisfaction, the Medical Officer of the *Scotia* reporting very favourably upon them.

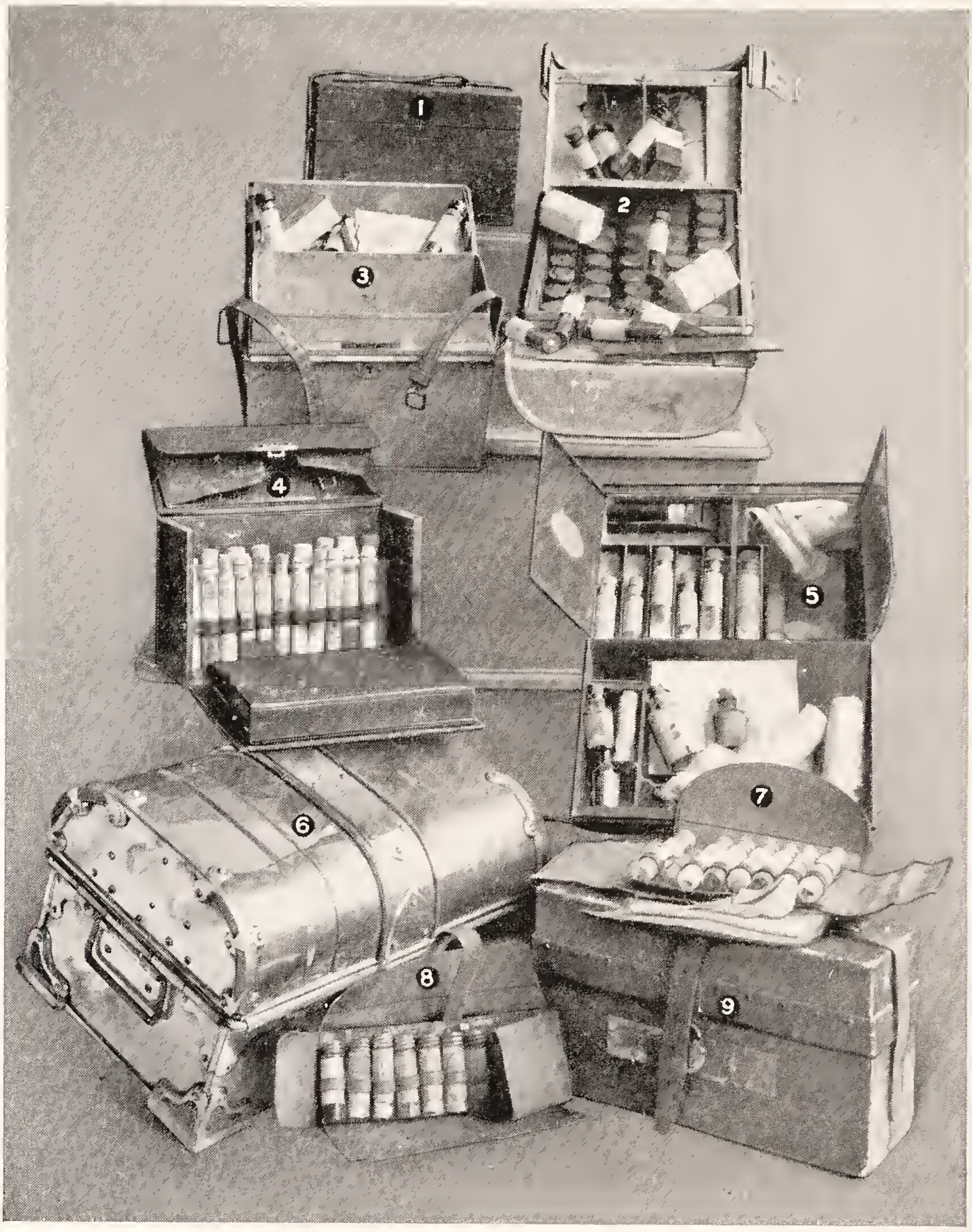
In each instance the remaining contents of the medicine chests brought back were found to have retained their therapeutic activity, notwithstanding the rigour of the climate to which they had been subjected.

On his memorable voyage with the *Nimrod*, when he penetrated within ninety-seven miles of the South Pole, Sir Ernest H. Shackleton took with him as his sole medical equipment 'Tabloid' Medicine Chests and Cases, and made the following report, showing the efficiency and stability of 'Tabloid' medicines under the trying and difficult conditions of Antarctic exploration:—

> "The British Antarctic Expedition, 1907–9, was equipped with a very complete Medical Equipment contracted for solely by Messrs. Burroughs Wellcome & Co., and consisting of 'Soloid' and 'Tabloid' Preparations, which are the only forms that can be conveniently carried and preserved under such conditions.
>
> "All the 'Tabloid' products that remain are now in as good condition as when first handed over to my care two years ago.
>
> *Signed*
> British Antarctic Expedition, 1907–9
> Ernest H. Shackleton,
> *Commander*"
>
> Eric P. Marshall, M.R.C.S., L.R.C.P.
> *Surgeon to the Expedition*

### In Africa

In the penetration of Africa, 'Tabloid' Medical Equipments have made the way of the explorer and the pioneer infinitely less perilous. It is hardly too much to claim indeed that, but for their aid, civilisation had still been impotently besieging the frontiers of disease that defend the interior of the Dark Continent. There were no roads, the climate was deadly, and everything had to be carried pack-fashion on the



Relic 'Tabloid' Medicine Cases—Travel, etc.

1—Harry de Windt's medical equipment, used on his travels in E. Siberia. 2—Chest taken by Ex-President Roosevelt on his recent shooting and hunting expedition in East Africa. 3—Chest carried by Lionel Declé on his three years' journey from the Cape to Uganda (6000 miles). 4—Mrs. Bishop (Miss Isabella Bird), in her book describing her extensive wanderings, highly commends this medicine case. 5—The medical equipment carried by Mrs. French Sheldon, F.R.G.S., on her adventurous expedition throughout the entire Congo Free State. 6—Duplicate of medicine chest taken by Sven Hedin on his unique journey beyond the Himalayas into the heart of Tibet. 7—Case carried by R. L. Jefferson, F.R.G.S., on his famous bicycle ride to Khiva. 8—Pocket-case carried by J. E. Budgett Meakin. 9—Medicine chest carried by Julius Price, of the *Illustrated London News*, for over 30,000 miles through various climes.

human head and shoulders. With 'Tabloid' Medical Equipments, a single porter could carry medical supplies sufficient for a regiment of men. By their aid the European explorer was enabled to traverse deadly swamp and fever-ridden forest in safety. Stanley records the difficulty in these words:—

> "When I think [he said in one of his lectures] of the dreadful mortality of Capt. Tuckey's Expedition in 1816, of the Niger Expedition in 1841, of the sufferings of Burton and Speke, and of my own first two expeditions, I am amazed to find that much of the mortality and sickness was due to the crude way in which medicines were supplied to travellers. The very recollection causes me to shudder."

Speaking at a later date of his wish to ameliorate the miseries of African explorers, he continues:—

> "How it was to be done I knew not; who was to do it I did not know. But I made the acquaintance of Messrs. Burroughs Wellcome & Co. As soon as I came in sight of their preparations and their works, I found the consummation of my secret wish. On my later expeditions I had all the medicines that were required for my black men, as well as my white men, beautifully prepared, and in most elegant fashion arranged in the smallest medicine chest it was ever my lot to carry into Africa."

Emin Pasha

The mention of Stanley recalls Emin Pasha, Gordon's Governor of Equatorial Africa. The last medicine chest supplied to him was the product of Burroughs Wellcome & Co. In a pathetic report he writes:—

> "I found the medicine chest you forwarded me fully stocked. I need not tell you that its very completeness made bound my heart. Articles like those could not be made but at the hand of the greatest artists in their own department. If any one relieved from intense pain pours out his blessings, they will come home to you.
>
> "I should like to expatiate somewhat longer on the intrinsical value, but sickness preventing me to do so. I wish you to believe me,"

Dr Emin Pasha

This chest was looted by the Arabs when Emin was massacred in 1892, and was recaptured by Baron Dhanis, Commandant of the Congo Free State troops, after the battle of Kasongo. It was subsequently stolen by natives, but afterwards recovered near Kenia, in the Aruwhimi Dwarf Country, and returned to Burroughs Wellcome & Co.

Another famous chest, the "Rear-Guard" 'Tabloid' Medicine Chest, remained in the swampy forest regions of the Aruwhimi for nearly four years, and more than once was actually submerged in the river. The remaining contents were tested by the official analyst of the *Lancet* (London, Eng.), when it was brought back to England, and the 'Tabloid' medicaments declared to have perfectly preserved their efficiency.

The tale might be continued. It is the history, practically, of the medical equipments of every punitive expedition and of every explorer for nearly 30 years. A single extract must suffice. It is from the report of the Special War Correspondent of the *Lancet* (London, Eng.), a veteran of many campaigns:—

Many campaigns

> "It affords me infinite satisfaction to state that I have myself for some years dispensed, and have also seen administered by medical officers of both Naval and Military Services, Burroughs Wellcome & Co.'s 'Tabloid' preparations during the Sudan, Ashanti, Benin, and recent South African Campaigns. I cannot refrain from expressing my opinions as to their distinct and marked superiority over the medicinal preparations of former days. They are far more portable, very acceptable so far as the palate is concerned, far less liable to absorb damp on service during rapid changes of climate, are always found exact as to their dose-weight, and, what is of far more importance, retain their efficiency much longer than any other medicinal products I know of. The firm of Burroughs Wellcome & Co. are deservedly to be congratulated upon the marked scientific advance they have made in pharmaceutical reform."

If, to-day, the savagery of all the welter of humanity that still hides in the darkness of darkest Africa, is receding—ever so slowly—before the march of Science, something is surely due to the 'Tabloid' weapons of precision with which disease and death have been fought.

The real problem of Africa

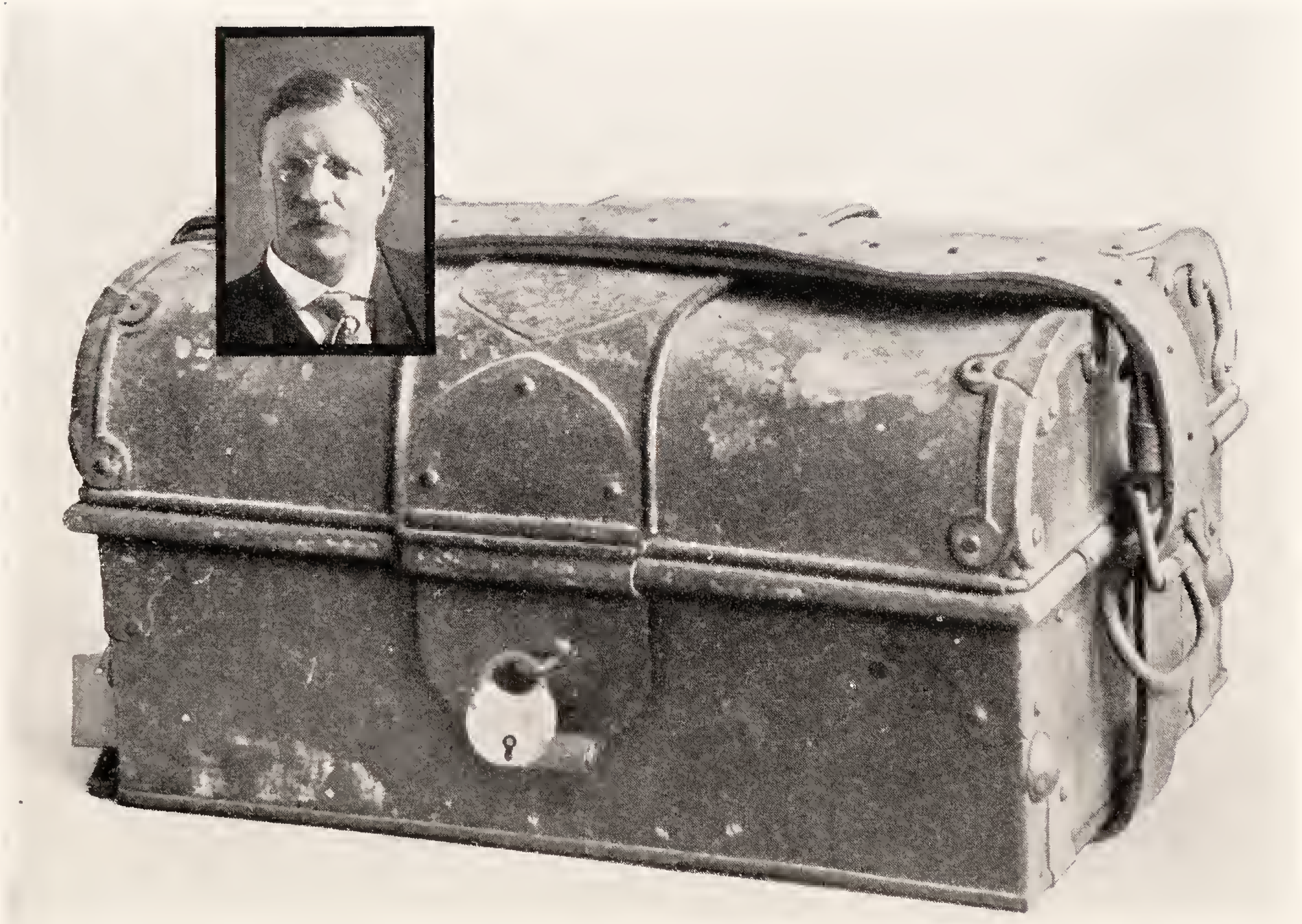
## In Travel and Exploration

The true traveller is born. The call of the beyond is in his blood. It may be merely the chafing of the restless spirit for a strange sky and a wider horizon; or the deeper longing of the reflective mind for something "over the hills and far away." Discontent has made travellers of some, desire for fame of others. In all, the result is action. Of one—a man of imagination and of magnetic qualities—Lord Morley has finely said, he was "a man with pity in him, with a sense of justice in him, with good-temper in him. . . . He raised no ill-will anywhere." Dr. Sven Hedin, of whom these words were spoken, for two long years wandered about the wildernesses of Tibet, tracing the "Mighty Mountain Palisade" of the trans-Himalaya and exploring the "Roof of the World." His constant companion was a 'Tabloid' Medicine Chest, which stood him in good stead in illness and hardship, and even in the primrose paths of diplomacy. At Shigatse he made it his offering of friendship to the Tashi-Lama. We are indebted to Messrs. Macmillan, Dr. Sven Hedin's publishers, for permission to quote his account of the incident:—

The born traveller

The "Roof of the World"

> "When we had conversed for two hours I made a move to leave him, but the Tashi-Lama pushed me back on to the chair and said, 'No, stay a little longer.' Now was the time to present my offering. The elegant English medicine chest was taken out of its silk cloth, opened and exhibited,



'Tabloid' Medicine Chest

supplied to

Ex-President Roosevelt

for his

Hunting Expedition

in

Africa

Inset is a photograph of
Ex-President Roosevelt

and excited his great admiration and lively interest; everything must be explained to him. The hypodermic syringe in its tasteful case, with all its belongings, especially delighted him. Two monks of the medical faculty were sent for several days running to write down in Tibetan the contents of the various 'Tabloid' boxes and the use of the medicines."

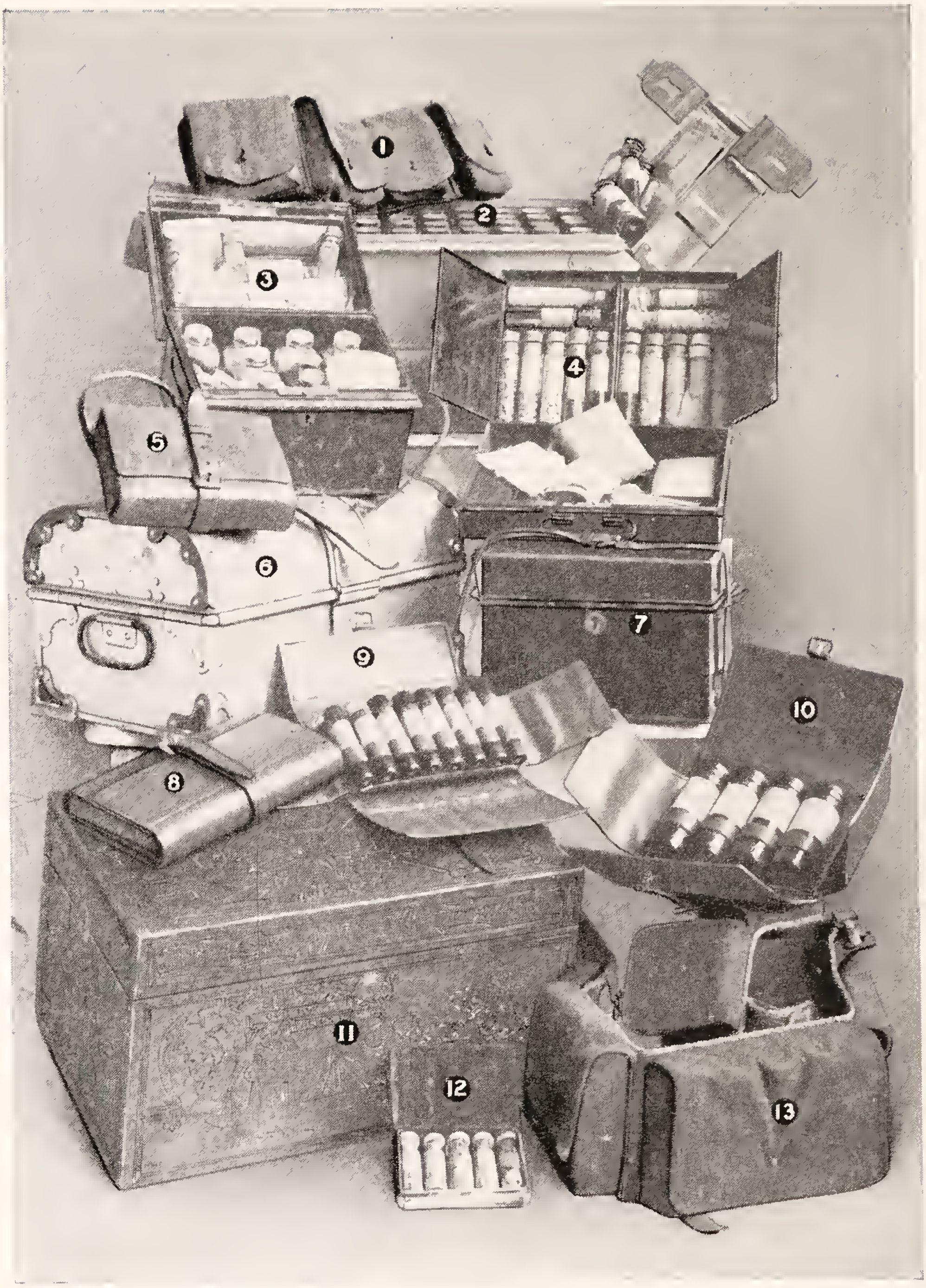
In Abyssinia

Such picturesque incidents do not stand alone in the annals of Burroughs Wellcome & Co. The U.S.A. Mission to Abyssinia in 1903 — the first American expedition to that Empire—found their 'Tabloid' Medicine Chest "a highly valued resource in time of trouble. It was carried on the back of a faithful domestic, rejoicing in a name which, being translated, means 'Slave of the Holy Trinity'"—reports a member of the Commission.

Again, Professor Garner, who studied at close quarters the habits of gorillas in the forests of the Gabuns, speaks affectionately of "my little 'Tabloid' Medicine Chest" as "a treasure more sacred than my rifle."

Some travellers of distinction

Ex-President Roosevelt, on his African expedition, took with him the 'Tabloid' Medical and Photographic Equipment, of which Lieut.-Col. Mearns reports:—"I wish to inform you that the equipment was most satisfactory in every way. The 'Tabloid' and 'Soloid' products, in addition to being convenient and compact, are extremely accurate and reliable. In this expedition the equipment never failed us, and is the most practicable it has been my pleasure to see or use." Many other travellers of distinction, including Glave, Muxworthy, Rendall. Captain Stairs, W. S. Caine, Mrs. Bishop (Miss Isabella Bird), and Mrs. French Sheldon, have been equipped with 'Tabloid' Medicine Cases, and have reported favourably on their portability and reliability.



RELIC 'TABLOID' MEDICINE CASES—WARFARE

1—One of the medicine belts used during the Spanish-American War. 2—One of the medicine chests used in the Ashanti Campaign, 1895-6. 3—G. W. Steevens carried this equipment through many campaigns and journeys. 4—A relic of many battles and sieges, formerly the property of W. Maxwell, war correspondent. 5—Cases of this design were used by British Colonial contingents during the South African War. 6—Part of the medical equipment of Greece during the war with Turkey, 1897. 7—Duplicate of the medical equipment of Bennet Burleigh, war correspondent. 8—The portable medical supply used on the Dongola Expedition. 9—A duplicate of the equipment used during the Anglo-Egyptian campaign in the Sudan. 10—A specially-designed case carried by the C.I.V. in the South African War. 11—A specially-designed chest, part of the medical equipment entirely supplied by Burroughs Wellcome & Co. for the Hospital Ship "Maine." 12—Pocket medicine case carried by Gen. Viljoen throughout the South African War. 13—Medicine belt used during the Benin Campaign.

## IN WARFARE

To Military Expeditions, 'Tabloid' Medical Equipments are as indispensable as the emergency ration. Their compression, compactness and convenience meet the first requirements of successful transport. In addition, they possess such advantages as purity, reliability and accuracy of dosage.

The human factor and 'Tabloid' First-Aid

The human factor in warfare requires, for efficiency, first to be fed, next to have its hurts and ailments tended. It is a well-known axiom of military operations that disease kills more men than do the bullets of the enemy. Many of the horrors of the Crimean War might have been averted had 'Tabloid' medicaments been available.

For more than a generation past, 'Tabloid' Medical Equipments have been used in every campaign of note. It is therefore impossible to deal with them in detail. During the war between the United States of America and Spain the utility of 'Tabloid' Outfits was tested and confirmed both in Cuba and the Philippines. In the campaigns of Kitchener, from Omdurman to South Africa, they have played a prominent part; as also in the Civil War in China.

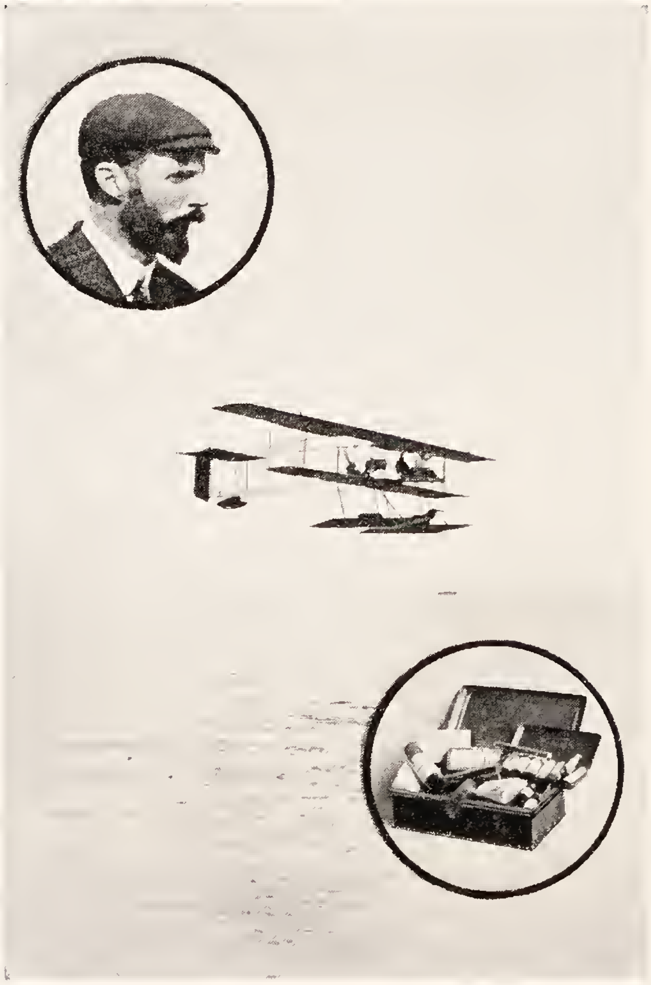
In these days, no war seems to be complete without its war correspondents—than whom no keener judges of kit and equipment exist. The list of eminent journalists who have carried 'Tabloid' Cases includes among other world-famous names, those of Bennet Burleigh, Frederick Villiers, René Bull, Julius Price and William Maxwell, the late G. W. Steevens, and a host of others. Of her husband's 'Tabloid' Outfit Mrs. Steevens reports:—

> . . . "He took it everywhere with him—to the Græco-Turk War, twice to the Soudan, India and lastly (well replenished by you) to South Africa."

## LOUIS BLÉRIOT

Louis Blériot was the first airman to fly across the English Channel (Calais-Dover, July 25, 1909), using a Blériot monoplane. Inset is the aviator's 'Tabloid' First-Aid Equipment. He reports as follows:—

"I find 'Tabloid' First-Aid Outfits most useful, and I have seen them in the hands of many of my friends, who, like me, think that no sportsman can run the risk of being without one."



## HENRI FARMAN AND HIS HYDROPLANE

Equally famous as airman, designer, and constructor of aeroplanes and hydroplanes. Writing in Esperanto he reports:—

*Translation*

"I find it very necessary for every aviator to have with him one of your 'Tabloid' First-Aid Cases, and to know Esperanto. With these two he can go anywhere.

"Fortunately I can say that I have not yet had a serious accident, but, working on the various apparatus, I have hurt myself several times, and was then glad to use the 'Tabloid' case, which saves much valuable time."

## In Aviation

"Flying resolves itself into a series of unforeseen incidents. It is then that we must command our nerves to avoid *un drame*," writes one of the greatest aeronauts of the day. "Even the least stirring of the air grips the machine and rolls it gently from side to side, while the stopping of the motor gives an acute if momentary pang of despair." Lost in the clouds, fog-bound, tempest-tossed, compelled in his huge kite to rush onwards through the obscure in order to preserve equilibrium and remain aloft—not knowing when he emerges whether he will find himself above the plain-lands, the streets or the sea—the instant emergency constantly confronts him, far, possibly, from any hope of human aid. The margin of safety to life and limb must be increased, not only by improving the powers of the machine, but by the provision of the essentials of treatment in its most readily accessible form—compact, reliable, and practically featherweight. The airman who ventures aloft without 'Tabloid' First-Aid is foolhardy.

Perils of the air

Increase the margin of safety

The first airman to deliver letters by aeroplane (Paris-Madrid) was Védrines. In crossing the Pyrenees, Védrines had to rise to a height of over 6000 feet (2000 metres) in order to surmount the pass of Somosierra. During this flight he was attacked by an eagle.

The first airman to deliver letters

In India, Pécquet (February 18, 1911) carried a whole mail of 6000 letters and postcards from Allahabad across the Jumna to Naini. Pécquet and Keith-Davies will be remembered as the first airmen to fly in India. Of 'Tabloid' First-Aid, Pécquet reports:—

Aviation in India

> "J'ai toujours emporté avec moi l'équipement Premier-Secours 'Tabloid,' et puis vous confirmer qu'il m'a toujours été de très grande utilité aux petits accidents que j'ai eus."

H Pécquet

### "BEAUMONT"

Naval-Lieut. Jean Conneau, better known under the *nom de vol* of "André Beaumont." Won the European Circuit Race, and also the *Daily Mail* $50,000 prize for the Circuit of Britain. He is seen examining 'Tabloid' First-Aid, No. 706, concerning which he reports:—

"Grâce à sa légèreté et son format la petite boîte 'Tabloid' First-Aid se recommande spêcialement aux aviateurs."

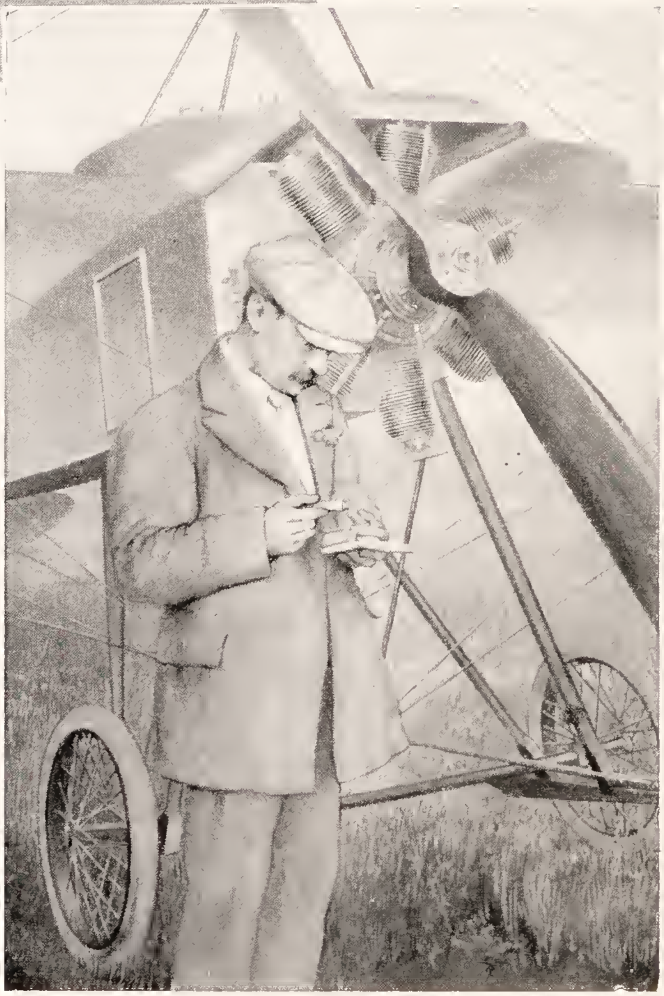
J Conneau

### VÉDRINES

Jules Védrines won the Paris-Madrid race in 1911, and was second in the *Daily Mail* $50,000 Air Race in 1911. In Jan., 1912, he attained a speed of 105½ miles per hour—a world's record. The photograph shows the aviator handling his 'Tabloid' Pocket-Outfit, concerning which he reports:—

"Je considère votre Premier-Secours 'Tabloid' comme très utile. Son peu de volume en fait un modèle d'une extrême commodité."

J. Védrines



British and American Aerial Posts

Mails have also been carried in England by Hamel and Hubert (between Hendon and Windsor), and in America by Earle Ovington. 'Tabloid' First-Aid Equipments were used on all these journeys. Earle Ovington, under the personal direction of Postmaster-General Hitchcock, carried the first U.S.A. Government Aerial Post.

The mail of the future

Captain Sido also took a 'Tabloid' First-Aid Equipment with him when he set out to establish a rapid postal service in French Senegal. These aerial experiments are interesting, though there is still much leeway to be made up before Kipling's daring forecast of a trans-Atlantic Aerial Post is realised.

Prominent aviators

Prominent among other aviators who have carried 'Tabloid' First-Aid Equipments during their flights are Blériot—first to fly the English Channel; Ely, who flew across San Francisco Harbour, landing like a bird on the deck of the cruiser "Pennsylvania," and flying back again to land; as well as Weymann, who won the Gordon-Bennett Cup for America in 1911; Fowler, who was saved at Alta from serious injury to limb in falling, by the 'Tabloid' Equipment he carried in his pocket; McCurdy, Sopwith, Tabuteau, Garros, Hubert Latham and very many others, from whom reports have been received. Latham reported as follows of his 'Tabloid' Equipment:—

> "Je tiens à vous dire combien m'a été utile votre trousse de Premier-Secours 'Tabloid.'
>
> "Elle est si peu volumineuse que je n'hésite jamais à l'emporter en aëroplane, et m'a rendu service plusieurs fois, surtout dans les meetings d'aviation où un pansement rapide est souvent nécessaire. Bien à vous."

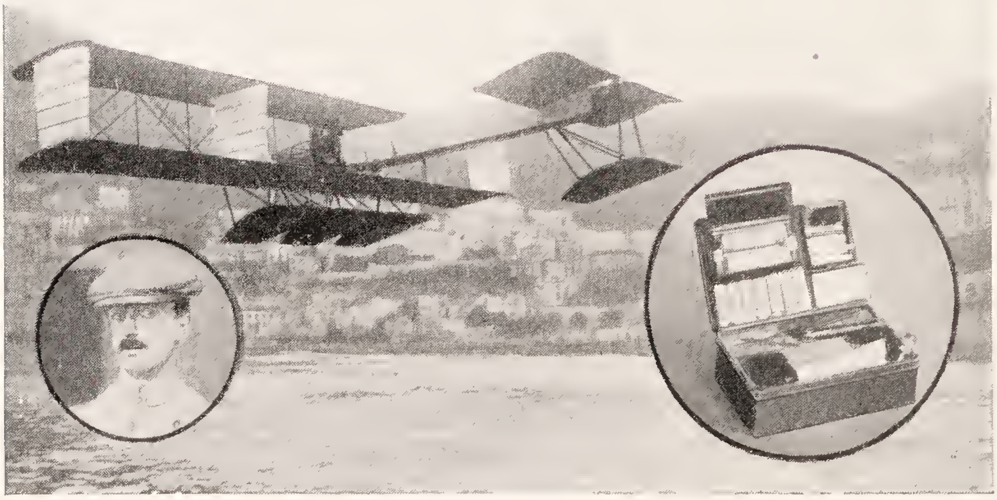
H Latham

## OVINGTON

Earle L. Ovington was the first man to carry the official United States mail in America. He was accompanied by Postmaster-General Hitchcock of the U.S.A. Government on one of his mail-carrying trips. Of his 'Tabloid' First-Aid equipments Mr. Ovington reported as follows:—

"I shall carry 'Tabloid' First-Aid Outfit with me on my trans-continental flight—the two smaller outfits on my aeroplane and the larger one on my special train. I have looked these outfits over very carefully and wish to compliment you upon the wonderful compactness and efficiency of your products."

Earle L. Ovington



## VOISIN

Gabriel Voisin was one of the pioneers of aeroplane and hydroplane construction, and is himself an accomplished aviator. He reports on his 'Tabloid' First-Aid Equipment as follows:—

"Nous avons bien reçu votre boîte de secours dont nous avons usé le jour même.

"Je dois dire que votre pharmacie est parfaitement complète et qu'elle a sa place dans toutes les voitures automobiles, et tous les aéroplanes."

Gabriel Voisin

Paulhan, after his race through darkness against time and his competitor, Grahame-White, in the *tour de force* flight from London to Manchester (*Daily Mail* $50,000 prize, 1910), made the following report:—

> "Je profite de cette occasion pour vous exprimer le plaisir que j'ai eu de porter avec moi durant le vol que j'ai fait de Londres à Manchester une trousse Premier-Secours 'Tabloid.'"

L Paulhan

Lieutenant Watkins, who was prevented by a broken leg from accompanying the Australian Antarctic Expedition, 1911, as official aviator, made the following report:—

> "Fortunately for myself I have had no occasion to use the small 'Tabloid' First-Aid you so kindly sent me, but a friend of mine, Dr. Pointer, R.A., who has been in aviation for many years, had a bad fall on his monoplane and was badly cut in many places. Your small outfit came in most handy. I consider that the 'Tabloid' Equipment you sent me for the Vickers monoplane is quite the most useful thing one could desire."

The rôle of the "dirigible"

The relative qualities and superiorities displayed, and the functions to be fulfilled respectively by heavier-than-air and lighter-than-air machines, continue to excite expert controversy, and even to influence the policy of governments. The evolution of a dominant type remains upon the knees of the gods. Whatever issue may emerge, the endeavour of Burroughs Wellcome & Co. will always be to maintain the historic association of their products with the evolution of scientific airmanship.

Great in conception was Wellman's effort to cross the Atlantic, on which the explorer brought

## GRAHAME-WHITE

Claude Grahame-White made a plucky attempt to win the first *Daily Mail* $50,000 prize, for a flight from London to Manchester in 1910. He won the Gordon-Bennett Cup for England at Belmont, N.Y., in the same year, on a Blériot monoplane. Made the first crossing of the Channel by hydro-aeroplane, July 6, 1912. Concerning his 'Tabloid' Equipment, he reports:—

" . . . I consider no aviator should be without one."

C. Grahame-White

## CODY

S. F. Cody has done important work for the British War Office, and uses aeroplanes of his own design. Winner of the British Michelin Trophies in 1910 and 1911, the British Empire Michelin Cup, No. 2, in 1911, and the British War Office Competition, 1912. He carries 'Tabloid' First-Aid as his medical equipment. Mr. Cody reports as follows:—

"The 'Tabloid' First-Aid Case has always been in its place on my machine and I have found the contents of inestimable value on numerous occasions."

The arrow indicates the position of the 'Tabloid' First-Aid.

to bear immense pains and forethought, and all the experience of his Arctic travels. The result revealed a task pre-destined to ultimate achievement. Wellman reports :—

> "We are glad to inform you that your 'Tabloid' Medical Equipment was the only one carried in the airship "America" during one thousand miles flight over the Atlantic Ocean. We had several occasions to use its contents for minor troubles, and found it complete and wholly satisfactory, which was but repeating the experience I have had with your equipments in my expeditions to the Arctic regions."

Walter Wellman

Mr. Wellman here refers to his 'Tabloid' Equipment for the dirigible "America," with which he had proposed to fly to the North Pole from Spitzbergen.

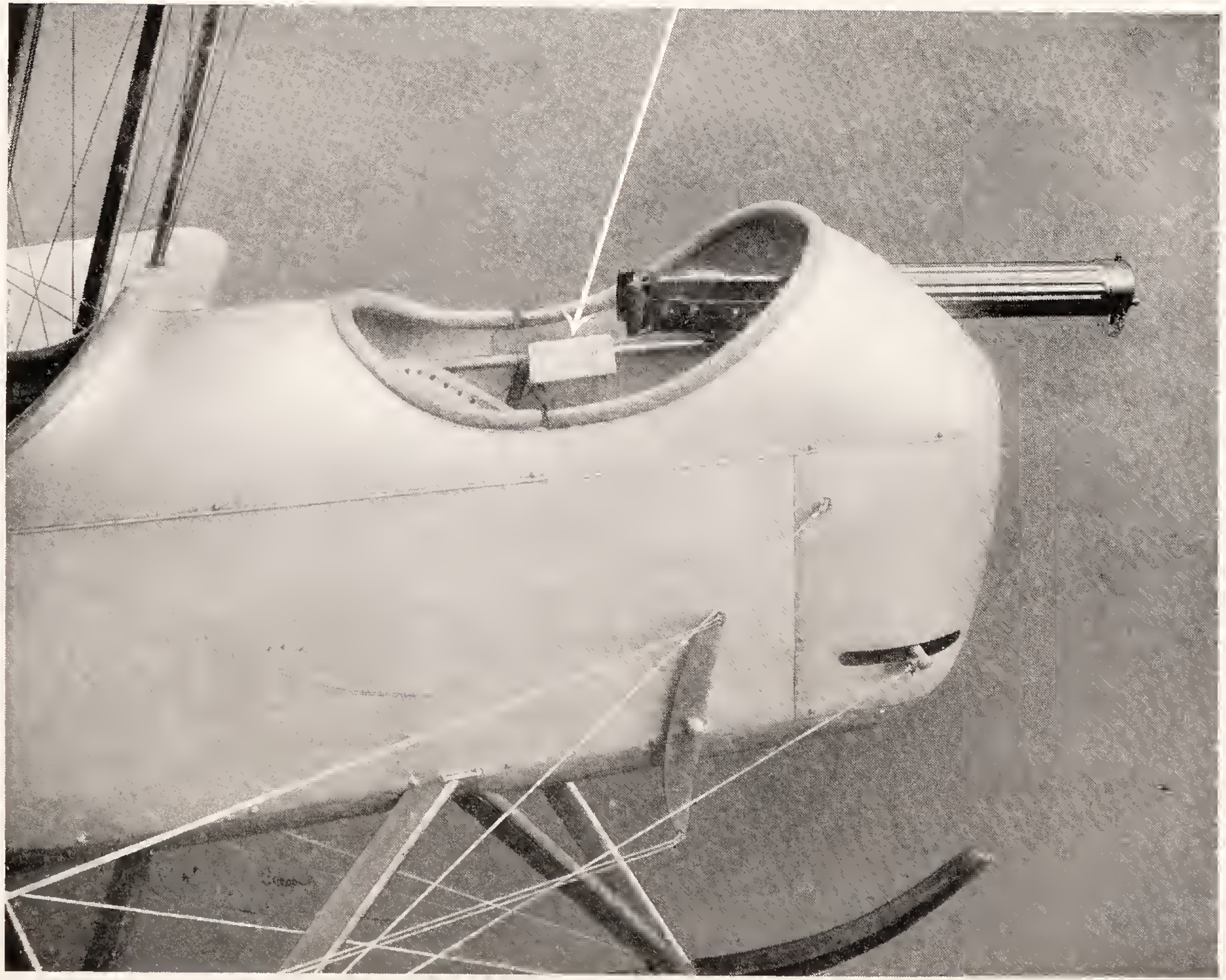
The British record for a long-distance balloon voyage is held by Messrs. Gaudron, Maitland and C. C. Turner, who, on November 18, 1908, started from the Crystal Palace, London, and on the following day alighted at Mateki Derevni, Novo Alexandrovsk, Russia, having travelled 1117 miles in 31½ hours. Their sole medical equipment was a 'Tabloid' Medicine Case, of which Mr. Turner reports :—

> "The 'Tabloid' First-Aid Aeronaut's Outfit proved most valuable during our balloon voyage to Russia. We used the 'Vaporole' Ammonia with excellent results when suffering from the presence of gas in the air. But for the other remedies we should probably have suffered considerably. In future voyages I shall certainly take a 'Tabloid' First-Aid Outfit."

Charles C. Turner

*(Cert. Av.)*

'Tabloid' Medicine Chests and 'Tabloid' First-Aid Equipments have also been supplied to Willows, Count Zeppelin, and many other aeronauts.



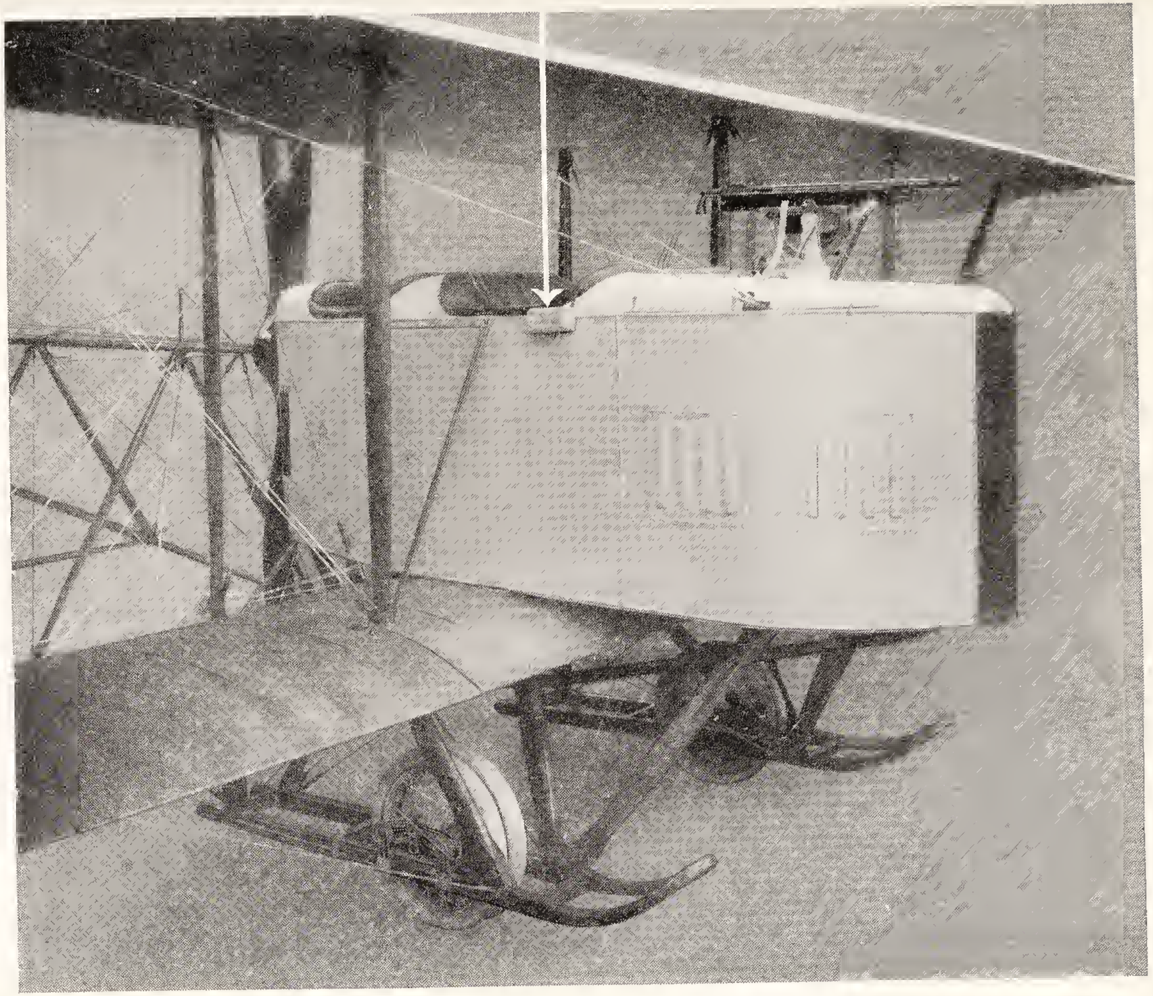
THE COCKPIT OF THE

"VICKERS" AERIAL DESTROYER

Showing the "Vickers" Quick-firing Gun

and

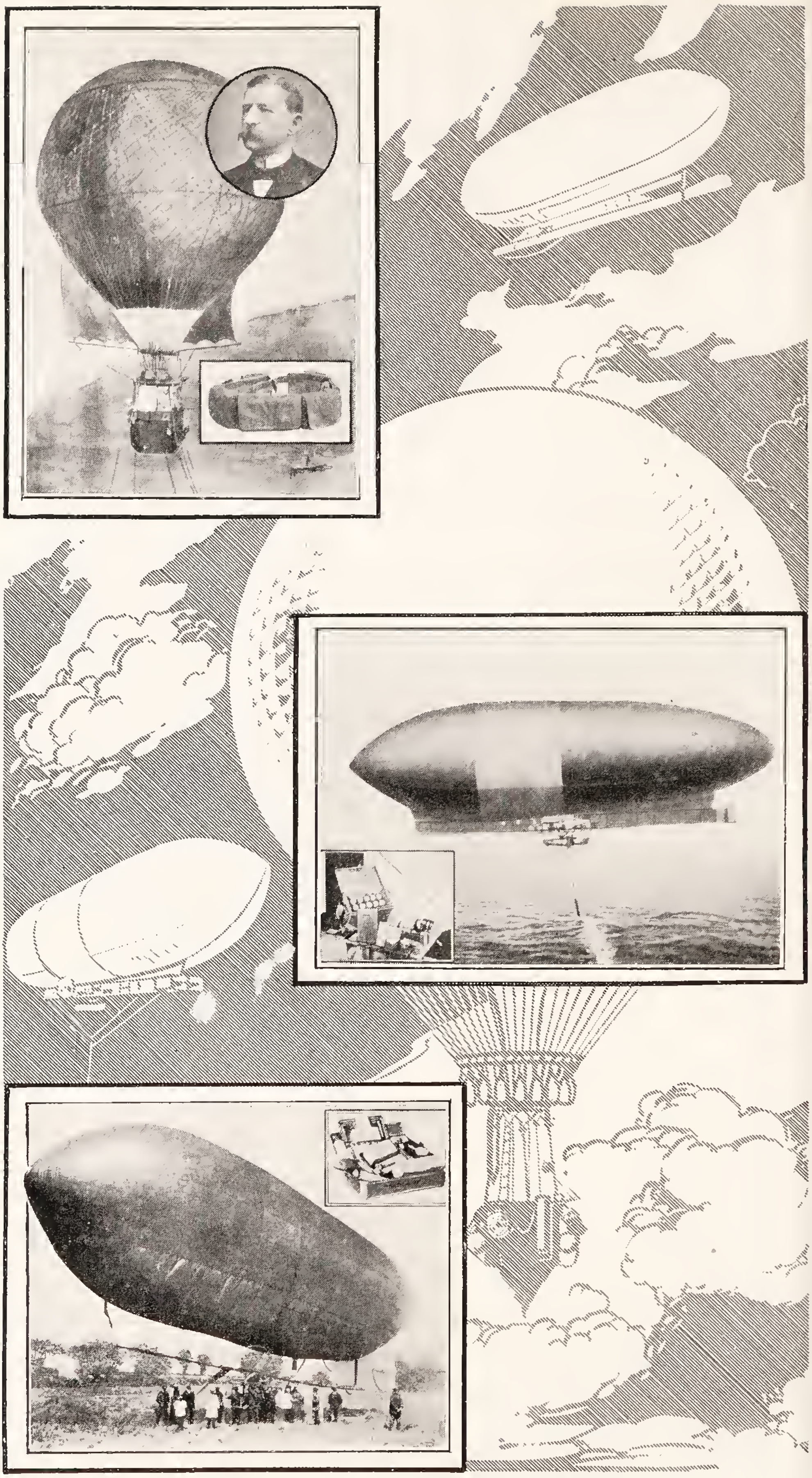
'Tabloid' First-Aid in position



The "Grahame-White"
Military Biplane

Armed with "Colt" Quick-firing Gun

The arrow in the photograph shows the
position of the
'Tabloid' First-Aid Outfit



BALLOON AND AIRSHIPS FITTED WITH 'TABLOID' MEDICAL EQUIPMENTS
1—Andree's Polar Balloon 2—Wellman's Airship "America"
3—Willow's Airship

*THE*

# Trade Marks

'Tabloid'
AND
'Soloid'

Invented
by
B. W. & Co.

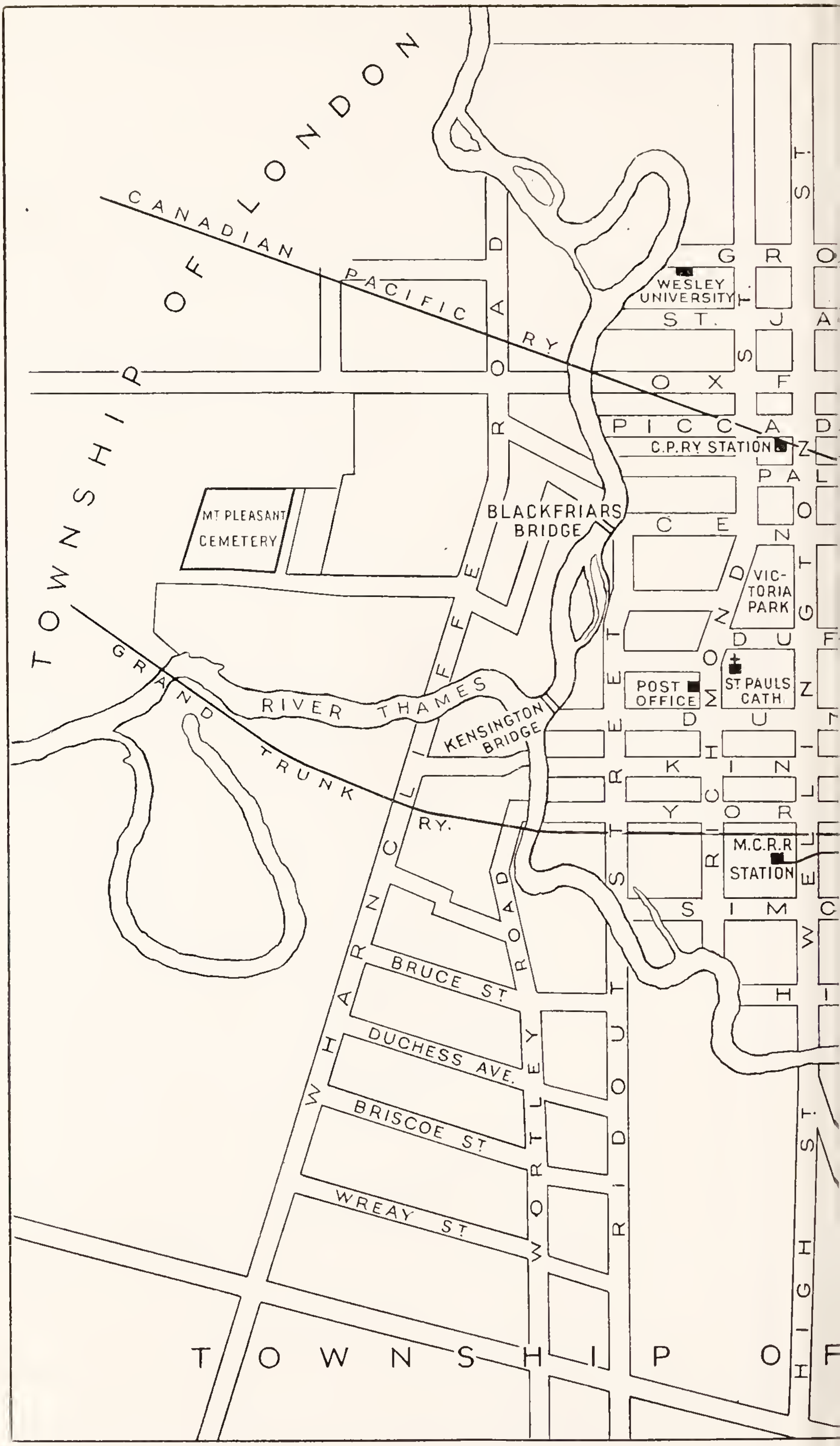
Are
B. W. & Co. **Hall Marks**

They *mark* the work of
Burroughs Wellcome & Co.

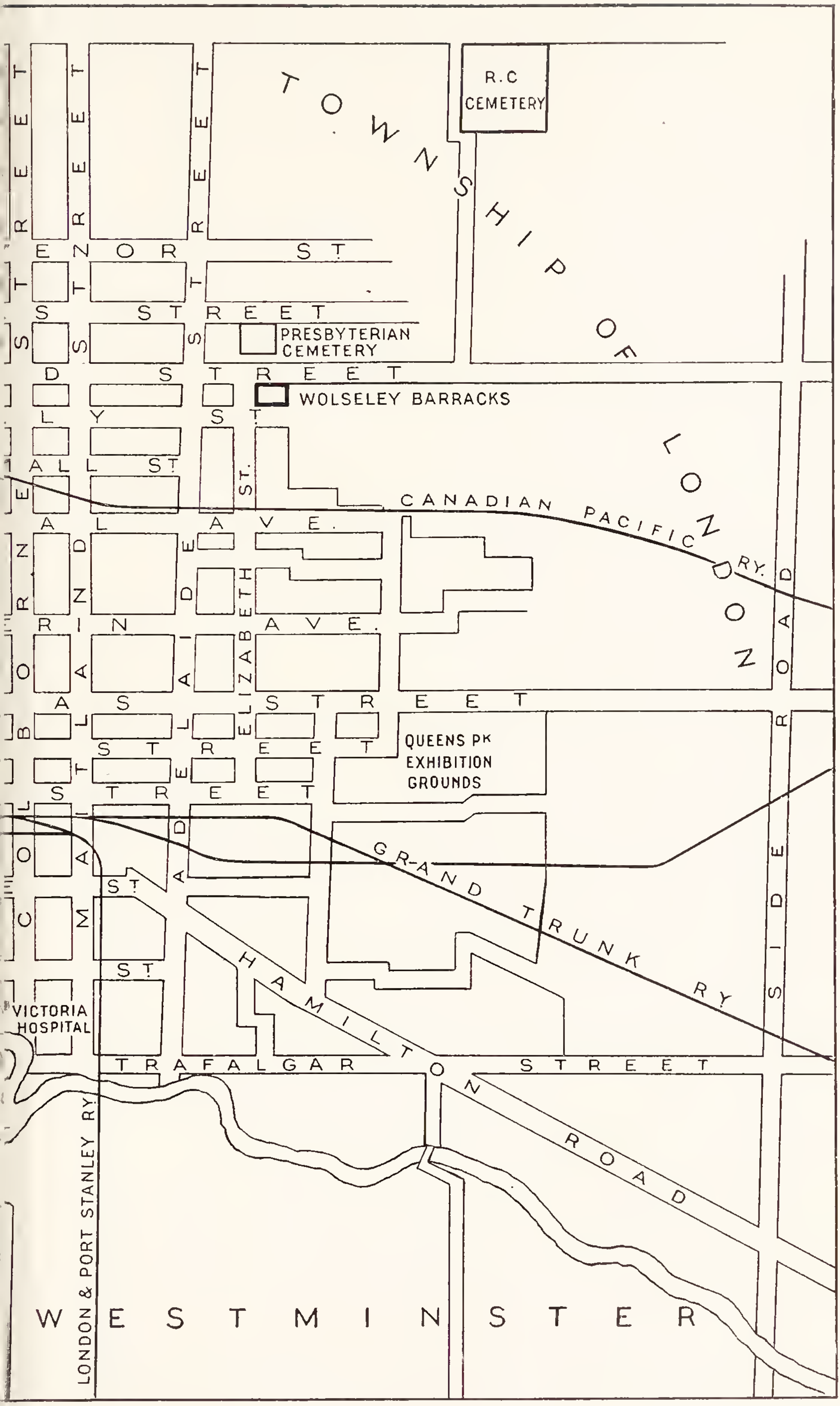
They *mean* "Issued by
Burroughs Wellcome & Co."

They *stand* for

**24 CARAT** products



Plan of London



ONTARIO, 1913